

**TOWARD GOVERNING EMISSIONS FROM AVIATION  
THAT CONTRIBUTE TO  
CLIMATE CHANGE AND GLOBAL WARMING**

**Md. Tanveer Ahmad  
Institute of Air & Space Law  
Faculty of Law  
McGill University  
Montreal, Quebec, Canada**

**September 2015**

**A thesis submitted to McGill University in partial fulfillment of the  
requirements of the degree of Doctor of Civil Law**

**© Copyright 2015 Md. Tanveer Ahmad  
All rights reserved.**

## Table of Contents

Table of Contents .....	1
Abstract .....	5
Résumé .....	7
Acknowledgements .....	9
Glossary .....	10
Chapter 1: Introduction .....	13
1.1 Introduction: the concept of climate change governance .....	13
1.2 The issue: why is it necessary to govern emissions from international civil aviation? .....	17
1.3 The contribution of the thesis .....	19
1.4 Thesis outline .....	20
1.5 Methodology .....	23
Chapter 2: Climate Change, Global Warming, and Aviation .....	24
2.1 Introduction .....	24
2.2 Climate change and global warming .....	24
2.3 The contribution of aviation to climate change and global warming .....	28
2.4 The effects of climate change and global warming on aviation .....	36
2.5 Conclusion .....	37
Chapter 3: Existing and Envisaged Measures to Govern Emissions from Aviation that Contribute to Climate Change and Global Warming .....	39
3.1 Introduction .....	39
3.2 Global measures to govern emissions contributing to climate change and global warming .....	40
3.2.1 Existing and envisaged global measures to mitigate climate change and global warming: general .....	40
3.2.1.1 Global climate change regime .....	42
A. United Nations Framework Convention on Climate Change .....	42
B. Kyoto Protocol .....	50
3.2.1.2 Ozone depletion regime .....	59
A. Vienna Convention for the Protection of the Ozone Layer .....	59
B. Montreal Protocol .....	62
3.2.1.3 Transboundary air pollution regime .....	65
3.2.1.4 Conclusion .....	66
3.2.2 Existing and envisaged global measures to mitigate climate change and global warming: aviation .....	68
3.2.2.1 Chicago Convention of 1944 .....	68
3.2.2.2 Annex 16 to the Chicago Convention .....	71
3.2.2.3 Other ICAO initiatives .....	75
3.2.2.4 Conclusion .....	79

3.3 Existing and envisaged unilateral measures to govern emissions from international civil aviation .....	80
3.3.1 The European Union Emissions Trading System .....	80
3.3.2 Local taxes on emissions .....	88
3.3.3 Airport emissions charges .....	90
3.4 Conclusion .....	92
Chapter 4: Effectiveness of the Existing and Envisaged Global Measures to Govern Emissions from International Civil Aviation that Contribute to Climate Change and Global Warming .....	
4.1 Introduction .....	93
4.2 The existing and envisaged legal measures .....	94
4.2.1 Global climate change regime: UNFCCC and Kyoto Protocol .....	94
4.2.2 Global legal measures in the field of aviation: Chicago Convention and International Civil Aviation Organization .....	101
4.3 Market-based measures in international civil aviation .....	105
4.3.1 The current state of market-based measures in aviation .....	105
4.3.2 The necessity of a global market-based measure for international civil aviation .....	107
4.3.3 The impact of a global market-based measure for international civil aviation .....	110
4.3.4 The 38 <sup>th</sup> Session of the ICAO Assembly and market-based measures: developed vs developing States .....	113
4.3.5 Reconciling the differences between developed and developing States .....	118
4.3.5.1 Representation .....	118
4.3.5.2 Common but differentiated responsibilities .....	119
4.3.5.3 Special circumstances and respective capabilities .....	124
4.3.5.4 <i>De minimis</i> threshold .....	125
4.3.5.5 Conclusion .....	126
4.3.6 A prospective global market-based measure for international civil aviation ...	127
4.3.6.1 Potential benefits .....	127
4.3.6.2 Necessary elements .....	129
4.3.6.3 Choice of options .....	130
4.3.6.4 Geographic coverage .....	133
4.3.6.5 Implementation .....	136
4.4 Technology .....	137
4.5 Operational opportunities and legal hurdles .....	141
4.5.1 The importance of operational improvements to reduce aviation emissions ...	141
4.5.2 The present state of operational improvements .....	142
4.5.3 Sovereignty, restricted airspace, and operational improvements .....	148
4.5.3.1 The issue .....	148
4.5.3.2 The evolution of the concept of State sovereignty .....	150
4.5.3.3 Climate change and global warming: new forces in the evolution process .....	156
4.5.3.4 Conclusion .....	162
4.6 Sustainable alternative fuels for aviation .....	163

4.6.1 Sustainable alternative fuels: a key measure to reducing environmental footprints of aviation .....	163
4.6.2 Existing situation with respect to sustainable alternative fuels for aviation ....	165
4.6.3 Prevailing challenges surrounding sustainable alternative fuels .....	167
4.7 Conclusion: the extent of effectiveness of global measures: need for reform? .....	173
Chapter 5: Effectiveness of the European Union Emissions Trading System to Reduce Emissions from International Civil Aviation that Contribute to Climate Change and Global Warming .....	176
5.1 Introduction .....	176
5.2 The motivating factors for introducing the EU ETS .....	178
5.3 The authority of the EU to adopt unilateral environmental measures: a brief analysis .....	185
5.3.1 States' sovereignty over their territorial airspace .....	185
5.3.2 Limits on sovereignty .....	188
5.4 Unilateralism, European Union, and the global environment .....	193
5.4.1 What is unilateralism? .....	193
5.4.2 Classification of unilateralism .....	196
5.4.3 A brief comparison between unilateralism and multilateralism .....	198
5.4.4 EU unilateralism: the case of noise emissions from aviation .....	201
5.4.5 Response to the EU's unilateral inclusion of aviation in the EU ETS .....	203
5.4.5.1 Response from States .....	204
5.4.5.2 Response from airlines and trade associations .....	208
5.4.5.3 Response from within the EU .....	210
5.4.5.4 Update on response: is a trade war ahead? .....	211
5.4.6 Impacts of the resistance from non-EEA States .....	215
5.4.7 The influence of the EU's unilateral actions in shaping global environmental norms .....	216
5.4.8 Unilateral market-based measures vs multilateral market-based measures .....	221
5.5 Conclusion .....	234
Chapter 6: Climate Change Governance and International Civil Aviation .....	238
6.1 Introduction .....	238
6.2 Disagreement between developed and developing States: the principal reason causing slow or no progress toward a legally binding global climate change deal .....	239
6.2.1 Introduction .....	239
6.2.2 States' knowledge of climate change and global warming .....	240
6.2.3 The current state of the global climate change regime .....	241
6.2.4 The existence of climate change deniers .....	244
6.2.5 The global fossil fuel industry .....	245
6.2.6 The politics of climate change: States' sovereignty and their concern over short-term self-interest .....	246
6.2.7 The Arctic Five .....	257
6.2.8 Contribution of citizens .....	260
6.2.9 Predicted consequences of climate change and global warming .....	261
6.2.10 Capitalism .....	262
6.2.11 Conclusion: need for global governance .....	263

6.3 Climate change governance in international civil aviation .....	265
6.3.1 Introduction .....	265
6.3.2 A brief introduction to global governance .....	266
6.3.3 Requirements for a successful governance .....	268
6.3.4 Actors in climate change governance .....	269
6.3.5 Climate change governance structure in international civil aviation: the role of various actors .....	276
6.4 Ensuring successful climate change governance in international civil aviation .....	285
6.5 Conclusion .....	298
Summary & Conclusions .....	301
Bibliography .....	308

## **Abstract**

Climate change and global warming are happening and have become a global challenge. These environmental issues have developed into a key item on the global political agenda; they have moved into mainstream political and economic policy discussions at all levels of governance.

Efforts to govern anthropogenic emissions that contribute to these environmental issues commenced in the 1980s at local, national, regional, and global levels. Such efforts from various global sectors, e.g., aviation sector, can also be observed. However, successful climate change governance in international civil aviation has yet to be achieved. No multilateral environmental treaties sufficiently addresses emissions from international civil aviation. The *Chicago Convention*, which is the primary source of public international air law, does not explicitly provide for aviation environmental issues.

In this respect, Annex I developed State Parties to the *Kyoto Protocol* have an obligation to work through the International Civil Aviation Organization [ICAO] to pursue limitation or reduction of greenhouse gas [GHG] emissions from aviation. Hence, the Protocol provides a mandate for ICAO to govern GHG emissions from international civil aviation. Furthermore, the *Chicago Convention* tacitly confers an obligation on ICAO to govern such emissions. Yet, the Organization has not succeeded in its governance initiatives. A basket of measures, which include one economic instrument, namely market-based measures, and three technical measures, namely technology improvements, operational improvements, and sustainable alternative fuels, is under consideration by ICAO and its Contracting States. Nevertheless, the basket cannot sufficiently govern aircraft engine emissions at its present condition. Most importantly, States have so far failed to adopt a global market-based measure for international civil aviation, which can provide a near-term solution.

Globally, airlines have taken some voluntary initiatives to decrease their carbon footprints. Unilaterally, the European Union and few European States have launched economic measures, e.g., emissions trading and tax, to reduce aircraft engine emissions. Nevertheless, their effectiveness in governing such emissions will be limited. Like the global climate change negotiation process, States are divided on certain issues in the ICAO process. Differences between developed and developing economies are delaying the entire process. Capitalism is much responsible for this division.

Since it is very difficult to reject capitalism altogether, several solutions, which do not discard but provide a new method of practicing capitalism, need to be employed. In the absence of a single global order, global governance in climate change – i.e. climate change governance – needs to be established to facilitate the deployment of those solutions. Market-based measures form part of those solutions. This thesis argues that, to successfully govern emissions from international civil aviation of relevance to climate change and global warming, binding legal measures, whether *de facto* or *de jure*, and a mandatory but temporary global market-based measure or unilateral market-based measures of the same model adopted by economically powerful States for international civil aviation are immediately required. This thesis demonstrates how *de jure* soft law instruments, e.g., Annexes to the *Chicago Convention*, international environmental law principles, a new understanding and way of exercising the doctrine of State sovereignty, and both multilateral and unilateral economic instruments can be utilized to reduce

aviation's environmental impacts. The thesis explores the existing capacities of the governance actors in aviation, and shows how they can play a significant role in climate change governance from within their limited capacities.

## Résumé

Le réchauffement planétaire (RP) et les changements climatiques (CC) actuels sont devenus un défi mondial, et sont désormais un élément important de l'agenda politique international et des discussions politiques et économiques, à tous les niveaux de gouvernance.

Des efforts pour contrôler les émissions anthropiques contribuant à ces problèmes environnementaux ont débuté dans les années 1980, au niveau local, national, régional et mondial. Des efforts similaires peuvent également être observés au niveau international dans différents secteurs, tels que l'aéronautique. Cependant, aucun succès en matière de gouvernance relative aux CC n'a encore été enregistré, pour l'aviation civile internationale (ACI). Aucun traité multilatéral sur l'environnement n'aborde de manière suffisante les émissions résultant de l'ACI. La *Convention de Chicago* (CdC), source principale du droit international public aérien, n'offre pas de solution explicite aux problèmes environnementaux liés à l'aviation.

A ce propos, les États développés visés par l'Annexe I du *Protocole de Kyoto*, ont l'obligation de travailler par le biais de l'Organisation de l'Aviation Civile Internationale (OACI), pour limiter ou réduire les gaz à effet de serre (GES) émis par l'ACI. Ainsi, le Protocole donne mandat à l'OACI, de réglementer les émissions de GES générées par l'ACI. Par ailleurs, la CdC confère de manière tacite à l'OACI, l'obligation de contrôler ces émissions. Cependant, l'OACI n'a pas remporté de succès en matière de gouvernance. Un corpus de mesures, incluant un instrument économique – mesures basées sur le marché (MBM) – et trois mesures techniques – améliorations technologiques, améliorations opérationnelles, carburants de substitution durables – est en cours d'étude par l'OACI et ses États membres. Cependant, ce corpus est insuffisant pour contrôler les émissions des moteurs d'aéronefs. Par ailleurs, pour l'instant, les États ont échoué à adopter une MBM fournissant une solution à court-terme pour l'ACI.

Au niveau international, des compagnies aériennes ont pris certaines initiatives, pour réduire leur empreinte carbone. L'Union Européenne et quelques États européens ont lancé unilatéralement des mesures économiques, comme l'échange de quotas d'émissions, et des taxes, afin de réduire les émissions des moteurs d'aéronefs. Cependant, leur efficacité sera limitée. À l'instar des négociations relatives aux CC, les États sont divisés sur certains points, dans les processus en cours à l'OACI. Les différences entre les pays développés et ceux en voie de développement, retardent toute la procédure. Le capitalisme est grandement responsable de cette division.

Étant donné la difficulté de rejeter le capitalisme dans son ensemble, plusieurs solutions, proposant une nouvelle forme de le concevoir, doivent être appliquées. En l'absence d'un ordre mondial unique, une gouvernance mondiale relative aux CC – la gouvernance des CC – doit être mise en place, afin de faciliter l'application de ces solutions, dont les MBM font partie. Cette thèse soutient que, pour contrôler de manière effective les émissions de l'ACI relatives aux CC et au RP, des mesures juridiques contraignantes *de facto* ou *de jure*, ainsi que des MBM, obligatoires mais temporaires, ou des MBM unilatérales du même genre que celles adoptées par les États les plus puissants économiquement, sont requises de manière immédiate. Cette thèse démontre comment les instruments *de jure* de droit souple, tels que les Annexes de la CdC, les principes du droit international de l'environnement, une nouvelle approche de la doctrine de la souveraineté des États, ainsi que des instruments économiques à la fois unilatéraux et multilatéraux, peuvent être utilisés



pour réduire les impacts environnementaux de l'ACI. Elle explore les moyens dont disposent les acteurs de la gouvernance de l'aviation, et montre comment ils peuvent jouer un rôle significatif dans la gouvernance des CC, malgré leurs pouvoirs limités.

## **Acknowledgements**

I am indebted to my supervisor, Professor Paul Stephen Dempsey, for his invaluable support, inspiration, and guidance throughout my doctoral process, which enabled me to finish this undertaking. I would also like to thank the two other members of my doctoral committee, Professor Armand de Mestral and Professor Ram S Jakhu, for their continuous support, encouragement, and suggestions. Many thanks to all my committee members for allowing me to work as their research assistant that enlarged my knowledge and research experience as well as partially sponsored my studies. I would like to acknowledge the McGill University Faculty of Law for providing me with, among other things, funding. I am also grateful to the International Civil Aviation Organization for granting me the prestigious Assad Kotaite Graduate and Postdoctoral Fellowship, and to the Boeing Company for the Boeing Fellowship in Air & Space Law. Without these funding, it would be impossible for me to accomplish this project.

I must acknowledge my professors and colleagues at the McGill University Institute of Air & Space Law for their strong support and assistance in completing this thesis. In this respect, I would like to specially thank Maria D'Amico for her support and inspiration. A special thanks to Rachel Pachoud, one of my beloved friends, for translating my Abstract into French. A very special thanks to Kuan-Wei (David) Chen for correcting and editing the English of the final version of my thesis.

It would be injustice if I do not thank some of my DCL colleagues who provided their valuable thoughts in improving my work. I am grateful to Dr. P Paul Fitzgerald (who taught me Government Regulation of Air Transport when I was an LLM student in 2009) for sharing his valuable expertise, creative ideas, and continuous encouragement. I would like to thank Dr. Alejandro Piera, Jeffrey J Smith, and Marios Seretis for giving me innovative ideas and sharing valuable resources. I am indebted to Marika Giles Samson for her relentless efforts to improve my confidence. Apart from my DCL colleagues, I would like to acknowledge Sam Brand, then Environment Officer at the International Civil Aviation Organization, for providing me with useful information.

A heartfelt thanks to my parents, my only sister, and my brother-in-law for their love, care, and constant support. The full confidence they had in me helped me reach this goal.

## GLOSSARY

ACI	Airports Council International
A-CDM	Collaborative Decision Making to improve Airport Operations
ASBU	Aviation System Block Upgrade
ASTM	American Society for Testing and Materials
ATM	Air Traffic Management
CAEP	Committee on Aviation Environmental Protection
CANSO	Civil Air Navigation Services Organisation
CBDR	Common But Differentiated Responsibility
CCO	Continuous Climb Operations
CDM	Clean Development Mechanism
CDO	Continuous Descent Operations
CERs	Certified Emission Reductions
CFCs	Chlorofluorocarbons
CH <sub>4</sub>	Methane
CJEU	Court of Justice of the European Union
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CNS/ATM	Communications, navigation, surveillance and air traffic management
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
COP	Conference of the Parties of United Nations Framework Convention on Climate Change
EAP	Environment Action Programme (of the European Community)
EASA	European Aviation Safety Agency
EC	European Community
ECAC	European Civil Aviation Conference
EEA	European Economic Area
EFTA	European Free Trade Association
ETS	Emissions Trading System
EU	European Union
FIRs	Flight Information Regions
G-77	Group of 77
GANP	Global Air Navigation Plan
GHG	Greenhouse Gas
GIACC	Group on International Aviation and Climate Change
H <sub>2</sub>	Hydrogen

HBFCs	Hydrobromofluorocarbons
HC	Hydrocarbons
HCFCs	Hydrochlorofluorocarbons
HEFA	Hydro-processed Esters and Fatty Acids
HLM-ENV	High-level Meeting on International Aviation and Climate Change
IAOPA	International Council of Aircraft Owner and Pilot Associations
IATA	International Air Transport Association
IBAC	International Business Aviation Council
ICAO	International Civil Aviation Organization
ICCAIA	International Coordinating Council of Aerospace Industries Associations
ICJ	International Court of Justice
ILC	International Law Commission
ICSA	International Coalition for Sustainable Aviation
IFALPA	International Federation of Air Line Pilots' Associations
IFATCA	International Federation of Air Traffic Controllers' Associations
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
LACAC	Latin American Civil Aviation Commission
LDCs	Least Developed Countries
LTO	Landing and Take-off
MBM	Market-based Measure
MEP	Member of European Parliament
MRV	Monitoring, Reporting and Verification
NGOs	Non-governmental Organizations
NO	Nitric oxide
NO <sub>x</sub>	Nitrogen oxides
NO <sub>2</sub>	Nitrogen dioxide
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of Petroleum Exporting Countries
O <sub>3</sub>	Ozone
PAIACC	Programme of Action on International Aviation and Climate Change
PBN	Performance Based Navigation
PCIJ	Permanent Court of Arbitration
RCAF	Royal Canadian Air Force

RNAV	Area Navigation
RNP	Required Navigation Performance
RVSM	Reduced Vertical Separation Minimum
SARPs	Standards and Recommended Practices
SCRC	Special Circumstances and Respective Capabilities
SESAR	Single European Sky ATM Research
SIDS	Small Island Developing States
SN	Smoke Number
SO <sub>x</sub> O	Sulfur oxides
SUSTAF	Sustainable Alternative Fuels Experts Group
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USAP CMA	Universal Security Audit Programme Continuous Monitoring Approach
USOAP CMA	Universal Safety Oversight Audit Programme Continuous Monitoring Approach
VFR	Visual Flight Rules
WMO	World Meteorological Organization
WTO	World Trade Organization

## **Chapter 1: Introduction**

### **1.1 Introduction: the concept of climate change governance**

Climate change and global warming are happening and have become a global challenge. The most recent assessment report of the Intergovernmental Panel on Climate Change asserts: “Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased”.<sup>1</sup> Within less than three decades, climate change and global warming have “developed from a rather obscure scientific topic into a key item on the global political agenda”;<sup>2</sup> these environmental problems have “moved from the realm of scientific research and environmental advocacy into mainstream political and economic policy discussions at all levels of governance”.<sup>3</sup> States have already concluded two multilateral environmental agreements, namely the *United Nations Framework Convention on Climate Change* [UNFCCC]<sup>4</sup> and the *Kyoto Protocol* to the same,<sup>5</sup> to particularly tackle these environmental problems. States are negotiating another climate change agreement that is expected to be concluded at the end of 2015 in Paris. Efforts to govern anthropogenic emissions to combat climate change and global warming are underway at local, national, regional, and global levels. Such efforts from various global sectors, such as aviation sector, can also be observed.

These endeavors to govern emissions that contribute to climate change and global warming are frequently referred to in the literature as climate change governance or climate governance. The UNFCCC and the *Kyoto Protocol*, which together constitute the existing global climate change regime, are jointly considered the “backbone” of the current climate change governance

---

<sup>1</sup> IPCC, “Summary for Policymakers” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 3 at 4.

<sup>2</sup> Thomas Bernauer & Lena Maria Schaffer, “Climate Change Governance” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 441 at 441.

<sup>3</sup> “Editors’ Introduction” in David Held, Angus Fane-Hervey & Marika Theros, eds, *The Governance of Climate Change: Science, Economics, Politics and Ethics* (Cambridge: Polity Press, 2011) 1 at 1.

<sup>4</sup> *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, Can TS 1994 No 7 (entered into force 21 March 1994) [UNFCCC].

<sup>5</sup> *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 162 (entered into force 16 February 2005) [Kyoto Protocol].

system at the global level.<sup>6</sup> Although much emphasis is now placed on adaptation,<sup>7</sup> climate change governance at the global level still is mainly focused on mitigation, i.e. emissions reduction, because “[a]t the very heart of the response to climate change...lies the need to reduce emissions”.<sup>8</sup> Climate change governance at the global level is a branch of global environmental governance that is also a part of broader global governance.<sup>9</sup> According to Professor Dunoff, “questions of environmental governance...lie at the heart of environmental law and policy.”<sup>10</sup> This is equally true for climate change governance. In fact, the necessity for effective global and national environmental governance systems has been recognized in several international conferences, such as the Rio+20 United Nations Conference on Sustainable Development and the World Congress on Justice, Governance, and Law for Environmental Sustainability.<sup>11</sup>

The concept of governance can be regarded as a theory.<sup>12</sup> Particularly, it can be considered as a political theory. About this concept, Professor B Guy Peters argues that, “if conceptualized adequately,...governance can be the foundation of a significant political theory that can be important for developing contemporary political science.”<sup>13</sup> Specifically, an emphasis on governance permits the political science discipline “to recapture some of its roots by focusing more explicitly on how the public sector, in conjunction with private sector actors, transnational actors, or alone, is capable of providing direction and control for society and the economy.”<sup>14</sup> The same

---

<sup>6</sup> Bernauer & Schaffer, *supra* note 2 at 442.

<sup>7</sup> See Tim Rayner & Andrew Jordan, “Governing Climate Change: the Challenge of Mitigating and Adapting in a Warming World” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 222 at 222.

<sup>8</sup> UN and Climate Change, “Towards a Climate Agreement”, online: UN <[www.un.org/climatechange/towards-a-climate-agreement/](http://www.un.org/climatechange/towards-a-climate-agreement/)>.

<sup>9</sup> See generally UN, Commission on Global Governance, *Our Global Neighbourhood: The Report of the Commission on Global Governance* (New York: Oxford University Press, 1995) at 208ff [Commission on Global Governance, *Our Global*].

<sup>10</sup> Jeffrey L Dunoff, “Levels of Environmental Governance” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 85 at 86.

<sup>11</sup> See Tseming Yang, “The Top Ten Trends in International Environmental Law” in Roger R Martella & J Brett Grosko, eds, *International Environmental Law: The Practitioner’s Guide to the Laws of the Planet* (Chicago: American Bar Association, 2014) 47 at 52.

<sup>12</sup> See Mark Bevir, “Governance as Theory, Practice, and Dilemma” in Mark Bevir, ed, *The SAGE Handbook of Governance* (London, UK: SAGE Publications, 2011) 1; Peer Zumbansen, “Governance: an Interdisciplinary Perspective” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 83 at 85; Gerry Stoker, “Governance as Theory: Five Propositions” (1998) 50:155 *Intl Social Science J* 17 at 17 (Wiley).

<sup>13</sup> B Guy Peters, “Governance as Political Theory” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 19 at 19.

<sup>14</sup> *Ibid.*

questions, Peters contends, “may arise for transnational governance”.<sup>15</sup> As mentioned, climate change and global warming have developed into a key item on the global political agenda; they have moved into mainstream political and economic policy discussions at all levels of governance. Thus, climate change governance has become a crucial matter of study for, and is being studied in, the political science discipline. As a recent matter of study for the discipline of political science, climate change governance can contribute to the concept of governance in becoming the foundation of a significant political theory which can be crucial for developing contemporary political science.

No widely accepted understanding of the concept of governance can be found at present.<sup>16</sup> For example, to Foucault, to govern is “to structure the possible field of action of others”.<sup>17</sup> According to Professor James Rosenau, governance is “a system of rule that is as dependent on intersubjective meanings as on formally sanctioned constitutions and charters... [It] is a system of rule that works only if it is accepted by the majority (or, at least, by the most powerful of those it affects)”.<sup>18</sup> The United Nations Commission on Global Governance defines governance as “the sum of the many ways individuals and institutions, public and private, manage their common affairs”.<sup>19</sup> Governance is “a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken.”<sup>20</sup> According to the Commission, the concept, at the global level, “has been viewed primarily as intergovernmental relationships, but it must now be understood as also involving non-governmental organizations (NGOs), citizens’ movements, multinational corporations, and the global capital market.”<sup>21</sup>

Nevertheless, Professor Stoker argues that there is “a baseline agreement that governance refers to the development of governing styles in which boundaries between and within public and private sectors have become blurred.”<sup>22</sup> Though Stoker’s argument relates to governance at the national level, the same is true with respect to global governance as is apparent from the statement

---

<sup>15</sup> *Ibid.*

<sup>16</sup> See e.g. Timothy J Sinclair, *Global Governance* (Cambridge: Polity Press, 2012) at 174.

<sup>17</sup> Michel Foucault, “Afterword: The Subject and Power” in Hubert Dreyfus & Paul Rabinow, eds, *Michel Foucault: Beyond Structuralism and Hermeneutics*, 2nd ed (Chicago: University of Chicago Press, 1983) 208 at 221.

<sup>18</sup> James N Rosenau, “Governance, Order, and Change in World Politics” in James N Rosenau & Ernst-Otto Czempiel, eds, *Governance Without Government: Order and Change in World Politics* (Cambridge: Cambridge University Press, 1992) 1 at 4.

<sup>19</sup> Commission on Global Governance, *Our Global*, *supra* note 9 at 2.

<sup>20</sup> *Ibid.*

<sup>21</sup> *Ibid* at 2–3.

<sup>22</sup> Stoker, *supra* note 12 at 17.



of the Commission on Global Governance. Though sovereign States still play a key role in global governance which includes climate change governance,<sup>23</sup> international organizations, treaty bodies, the scientific community, non-governmental organizations, and businesses, among others, now play a significant role.<sup>24</sup>

This thesis concentrates on climate change governance in international civil aviation. Hence, the thesis makes a daring attempt to evaluate existing and envisaged measures, both multilateral and unilateral, to govern emissions from international civil aviation, and recommends ways to ensure successful governance in this global transportation sector. In this regard, the thesis examines the current climate change governance structure in international civil aviation, focusing on the role of various actors in the structure, which include the International Civil Aviation Organization [ICAO], its Contracting States, aviation industry, airlines, and non-governmental organizations, and explores and proposes various ways through which these actors can ensure successful governance. Due to its concern over climate change governance in international civil aviation, this thesis, in effect, is concerned with the governance theory. The thesis argues that, to successfully govern emissions from international civil aviation, binding legal measures, whether *de facto* or *de jure*, and a mandatory but temporary global market-based measure or unilateral market-based measures of the same model adopted by economically powerful States for international civil aviation are immediately required. The main focus of the thesis is on market-based measures. It is worth mentioning that economic instruments, which include market-based measures, have long been recognized as one of the important tools to ensure global environmental governance.<sup>25</sup>

---

<sup>23</sup> See generally David Held & Angus Hervey, “Democracy, Climate Change and Global Governance: Democratic Agency and the Policy Menu Ahead” in David Held, Angus Fane-Hervey & Marika Theros, eds, *The Governance of Climate Change: Science, Economics, Politics and Ethics* (Cambridge: Polity Press, 2011) 89 at 105. Peters, *supra* note 13 at 21, argues that “[t]he tendency of some contemporary theories of governance to read the state out of [its] central position [in governance]... appears misguided. Just as more traditional versions of governance that excluded non-state actors ignored a good deal of importance in governing, so too would any conception – academic or practical – that excluded the state from a central role.”

<sup>24</sup> See e.g. Daniel Bodansky, Jutta Brunnée & Ellen Hey, “International Environmental Law: Mapping the Field” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 1 at 16–21; Philippe Sands et al, *Principles of International Environmental Law*, 3rd ed (New York: Cambridge University Press, 2012) ch 3; Dunoff, *supra* note 10.

<sup>25</sup> See Commission on Global Governance, *Our Global*, *supra* note 9 at 211–14; Richard B Stewart, “Instrument Choice” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 147 at 151–52.

## **1.2 The issue: why is it necessary to govern emissions from international civil aviation?**

Aviation is a small but significant contributor to climate change and global warming. It is a small contributor since it is responsible for approximately 2 percent of global carbon dioxide (CO<sub>2</sub>) emissions. However, it is a significant contributor since, if aviation sector were a State, the sector would be the 7<sup>th</sup> largest emitter of greenhouse gases and the 17<sup>th</sup> largest emitter of CO<sub>2</sub>. The aviation industry is rapidly growing outpacing technological reductions in emissions. Hence, aviation's contribution will significantly rise given the industry's current trend of growth.

Aviation is the only human enterprise that emits gases in the upper atmosphere. The aviation industry will not be able to escape the negative effects of climate change and global warming. Such effects will cause disruption of air transport services and facilities, which costs both the airlines and the passengers, and will endanger the existence of a good number of important airports worldwide. Climate change and global warming are global issues. Emissions occurring anywhere in the world and from any sources can contribute to these environmental problems. As a global sector, emissions from aviation frequently occur beyond the jurisdiction of States, making it difficult for a single State to regulate those emissions for lack of jurisdiction over them. To facilitate global efforts to effectively combat climate change and global warming, simultaneous action from the aviation sector is imperative, since one sector's inaction, especially those sectors which, like the aviation sector, are significant contributors to these environmental problems, can frustrate efforts from other sectors. Hence, it is essential for this global sector to contribute to the global efforts at combating climate change and global warming. In other words, climate change governance in international civil aviation is warranted. Additionally, due to jurisdictional issues, such governance should take place at the global level, since any State's attempt to regulate emissions occurring beyond its national jurisdiction is likely to meet with huge protest from third States. A vivid example is the European Union's [EU] Emissions Trading System [ETS] that has encountered massive resistance from the non-European Economic Area [EEA] States after the Union included aviation in the scheme in January 2012. Due to such resistance, the EU had to amend its original scheme by limiting its geographic scope within the airspace of the EEA Member States. Originally, the scheme had extraterritorial reach since emissions from all civil aircraft, wherever they occurred, that depart from or arrive in any aerodrome located in any EEA Member State were covered.

In reality, much attention to emissions from aviation has been directed after the EU decided

to include airlines from non-EEA States in its trading scheme. Although aviation emissions emerged as a problem in the 1970s, and the *Kyoto Protocol* provided ICAO with a mandate to regulate such emissions that accelerate climate change and global warming,<sup>26</sup> the Organization's work in this area was slow till the EU's unilateral action. The existing climate change regime does not appropriately address emissions from international civil aviation. The primary source of public international air law – the *Chicago Convention* that was concluded in 1944<sup>27</sup> – does not explicitly provide for environmental issues. Nonetheless, the 1944 Convention tacitly confers an obligation on ICAO, the global forum of States for international civil aviation,<sup>28</sup> to address aircraft engine emissions, since one of the aims and objectives of the Organization is:

to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to:

...

i) Promote generally the development of all aspects of international civil aeronautics.<sup>29</sup>

ICAO's work with respect to climate change and global warming has progressed much. However, such progress has not culminated into any effective multilateral system to fight these environmental issues from the aviation sector. Emissions from international civil aviation that contribute to these environmental issues remain largely unregulated. This is one of the reasons (in fact, the prime reason) why the EU did not wait for a multilateral solution agreed-to at ICAO and, instead, included aircraft operators of non-EEA States in its ETS.

Yet, it should not be ICAO but its Contracting States that should be blamed for this failure to achieve an effective multilateral system. Disagreement between developed and developing States over few issues has caused, and continue to cause, delay in the ICAO process. States are heavily concerned with some established, but archaic, principles including the doctrine of State sovereignty, the principle of non-discrimination, and the principle of equality of opportunity. As a consequence, States are not prepared to modify some of their existing practices, relating to the exercise of sovereignty, to give way to newer methods of operating aircraft. Nor are they, mostly developed States, willing to accept emerging principles of international environmental law, e.g., the principle of common but differentiated responsibilities, which are required to ensure successful

---

<sup>26</sup> *Kyoto Protocol*, *supra* note 5, art 2(2).

<sup>27</sup> *Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295, Can TS 1944 No 36, ICAO Doc 7300/9 [*Chicago Convention*].

<sup>28</sup> ICAO, "Vision & Mission", online: ICAO <[www.icao.int/about-icao/Pages/vision-and-mission.aspx](http://www.icao.int/about-icao/Pages/vision-and-mission.aspx)>.

<sup>29</sup> *Chicago Convention*, *supra* note 27, art 44.

climate change governance through increased States' participation. Such divergence of attitudes appears to be one of the stumbling blocks in attaining any meaningful solution to govern emissions from the aviation sector. However, this scenario is prevalent not only in the aviation sector but in all sectors; climate change negotiations at the global level suffer from the same difficulty. The existence of a single global order, e.g., a world government, would help overcome this difficulty. However, since this cannot happen, at least in the foreseeable future, resort has to be made to "governance". In the absence of a "global government", "global governance", more specifically "global environmental governance" to which climate change governance is a part, can provide a solution to govern anthropogenic emissions that accelerate climate change and global warming. Therefore, climate change governance in international civil aviation needs to be ensured.

### **1.3 The contribution of the thesis**

Climate change and global warming embraces various disciplines which include, but not limited to, science, law (particularly environmental law), social sciences, economics, political science, international relations, and business. The theory of governance itself is of an interdisciplinary nature. As a part of governance theory, climate change governance has interdisciplinary dimensions as well. The concern of this thesis over these environmental issues and climate change governance makes it an interdisciplinary research paper with an emphasis on aviation environmental issues. Hence, this thesis contributes to the knowledge of those disciplines. Furthermore, it contributes to the climate change governance literature and, as a consequence, to the global environmental governance literature. The main purpose, nevertheless, is to contribute to the growing literature on aviation environmental law, which includes climate change governance. Currently, ICAO, States, airlines, the aviation industry, and non-governmental organizations, among others, are heavily concerned with the question how to successfully govern emissions from international civil aviation that are of relevance to climate change and global warming. This thesis attempts to answer that question. This thesis demonstrates how *de jure* soft law instruments, e.g., Annexes to the *Chicago Convention*, international environmental law principles, a new understanding of and way of exercising the doctrine of State sovereignty, and both multilateral and unilateral economic instruments, i.e. market-based measures, can be utilized to reduce aviation's environmental impacts. It further explores the existing capacities of the governance actors in international civil aviation, and shows how they can play a significant role in

climate change governance from within their limited capacities. It is, therefore, expected that this thesis will assist these governance actors to secure successful climate change governance in international civil aviation through making a valuable contribution to their knowledge.

#### **1.4 Thesis outline**

Chapter 2 provides information regarding climate change, global warming, and the contribution of aviation thereto. The ultimate purpose of the Chapter is to demonstrate why it is necessary to govern emissions from aviation that contribute to climate change and global warming. In this respect, several factors, which include scientific and technical reasons, have been revealed that necessitate a global action from the aviation sector to govern such emissions. The second section briefly discusses climate change and global warming, and their adverse effects. The third section is devoted to the discussion of aviation's contribution toward accelerating climate change and global warming. The fourth section deals with the effects of climate change and global warming on aviation. The final section provides a conclusion to Chapter 2.

Chapter 3 provides an overview of the multilateral and unilateral measures, both existing and envisaged, of legal, technical, and/or economic nature to reduce anthropogenic emissions that contribute to climate change and global warming. The issue of emissions from domestic civil aviation is beyond the scope of this thesis and, thus, the chapter's focus is on emissions from international civil aviation of relevance to climate change global warming. The discussion of existing and envisaged measures concentrates on the effectiveness of the legal instruments used to provide for and give effect to these measures. Legal instruments occupy the most important position in any governance initiative, since they, *inter alia*, are often used to establish governance structures, and their effective implementation is one of the means to ensure successful governance in any area. The chapter reveals the insufficiency of the legal instruments to govern aircraft engine emissions. The second section of Chapter 3 briefly discusses existing and envisaged global measures to govern emissions from international civil aviation. The third section addresses existing unilateral environmental measures to govern aircraft engine emissions. The fourth section provides a conclusion to Chapter 3.

Chapter 4 evaluates the environmental effectiveness of the existing and envisaged global measures, discussed in Chapter 3, to govern emissions from international civil aviation that contribute to climate change and global warming. Four principal criteria for assessing

environmental policy instruments for climate change mitigation are reported in the literature, namely, environmental effectiveness, cost-effectiveness, distributional considerations, and institutional feasibility. However, among them which criteria are the most appropriate for an analysis of environmental policy cannot be determined as a result of lack of guidance from the literature in the fields of economics and political science. Since initiatives in the field of aviation toward climate change and global warming are relatively new and, for the most part, still at their development stage, their effectiveness in terms of meeting environmental objectives has to be preliminarily assessed. Hence, Chapter 4 focuses mainly on the environmental effectiveness of the global measures in the field of aviation. Nonetheless, the remaining criteria are considered where appropriate. Chapter 4 is divided into seven sections. The first and seventh sections provide an introduction and a conclusion, respectively. The second section considers the effectiveness of the existing and envisaged legal measures in reducing emissions from international civil aviation of relevance to climate change and global warming. The four sections that follow deal with the effectiveness of ICAO's basket of mitigation measures for international civil aviation. The third section focuses on market-based measures, the only economic measure in the basket, and the fourth, fifth, and sixth sections address the three technical measures in the basket, namely technology improvements, operational improvements, and sustainable alternative fuels, respectively. Chapter 4 concludes that neither the existing and envisaged legal measures nor the mitigation measures in the basket at their present state can effectively govern emissions from international civil aviation that contribute to climate change and global warming. Binding legal measures, whether *de facto* or *de jure*, and a mandatory but temporary global market-based measure for international civil aviation are immediately required if States genuinely aspire to diminish aviation's environmental footprints.

Chapter 5 assesses the effectiveness of the unilateral measure of the EU, namely, the EU ETS, to reduce – in other words, govern – emissions from international civil aviation. The decision to include aviation in the EU ETS is a notable step taken by the Union for a noble cause, namely to reduce emissions from aviation that significantly contribute to climate change and global warming. Chapter 5 demonstrates, however, that the EU ETS will only be able to partially meet this objective of limiting emissions from aviation. The most significant factor contributing to the scheme's lack of complete success is that this decision of the EU was met with immense opposition and protest from a significant number of governments, airlines, and trade associations. This vast

opposition and protest caused the Union to significantly revise its original decision until at least 2016. It is argued, as well as demonstrated, that such resistance will hinder the effectiveness of the EU ETS with respect to foreign airlines, the existing friendly relationships among States, the EU's prospective role as a norm entrepreneur, and its ability to influence negotiations. Together, these will result in the limited effectiveness of the trading scheme in reducing emissions from aviation, thereby undermining its environmental value. Chapter 5 commences with a section dealing with the reasoning behind the EU's decision to include international civil aviation in the EU ETS. The third section discusses the authority of the Union to adopt unilateral environmental measures that apply to international civil aviation. The fourth section, which is the heart of Chapter 5, analyzes the effectiveness of unilateral measures with particular emphasis on the EU's unilateral actions and on international civil aviation. That section, though exposes the limited effectiveness of unilateral measures in dealing with global environmental problems, e.g., climate change and global warming, contends that, to effectively tackle climate change and global warming from the aviation sector, we need either a well-designed, multilateral market-based measure or unilateral market-based measures of the same model adopted by economically powerful States. The fifth section provides the conclusion of Chapter 5.

The principle purpose of this thesis is to evaluate the existing and proposed measures to govern emissions from international civil aviation that contribute to climate change and global warming, and, after due assessment, to explore and suggest ways to attain successful governance of such emissions. However, a detailed discussion of climate change governance and of ways to ensure successful governance in international civil aviation has not been performed in earlier chapters. Chapter 6 performs that task. The following four activities are taken into account while addressing the question how to ensure successful governance in international civil aviation with respect to emissions from aviation: goal selection; goal reconciliation and coordination; implementation; and feedback and accountability. The second section attempts to identify the underlying causes that fuel differences between developed and developing States which have made climate change governance at the global level, not only in the aviation sector, difficult. In this respect, the section endeavors to answer the following question: why can developed and developing States not agree on a binding global climate change agreement that is pivotal in ensuring successful climate change governance? Since climate change governance in international civil aviation takes place at the global level, the concept of global governance is briefly explored

in third section. That section provides a brief introduction to the concept of global governance, defines the requirements for a successful governance, identifies relevant actors in climate change governance, specifically in the field of international civil aviation, and discusses their role in the climate change governance structure in aviation sector. The fourth section addresses the issue of attaining successful climate change governance in international civil aviation, with particular emphasis on ICAO and its governance structure. That section also suggests a few recommendations on how successful governance can be achieved in international civil aviation. The fifth section provides the conclusion. Following Chapter 6, a summary and conclusions of the entire thesis is provided.

### **1.5 Methodology**

This thesis chiefly employs the critical/reformist methodology to develop its argument. This methodology is used since the main purpose of this thesis is to critically assess the existing and proposed measures to govern emissions from international civil aviation that contribute to climate change and global warming, and, after due evaluation, to explore and suggest ways to attain successful governance of such emissions – i.e. successful climate change governance. The thesis uses a significant amount of primary and secondary sources, which include: treaties, United Nations documents, ICAO documents (including ICAO Assembly resolutions and ICAO reports related to aviation environmental issues), IPCC reports (specially, the fourth and fifth assessment reports, and its special report on aviation emissions), EU documents, decisions of international courts and arbitral tribunals, books and book chapters authored by highly qualified publicists, articles published in peer-reviewed journals, encyclopedias, dissertations, dictionaries, articles published in magazines, news portals, and a variety of electronic sources. While primary sources are mainly consulted, secondary sources are used to bolster various arguments.



## **Chapter 2: Climate Change, Global Warming, and Aviation**

### **2.1 Introduction**

This chapter provides information regarding climate change, global warming, and the contribution of aviation thereto. The ultimate purpose of this chapter is to demonstrate why it is necessary to govern emissions from aviation that contribute to climate change and global warming. In this respect, several factors, which include scientific and technical reasons, reveal the necessity of global action from the aviation sector to govern such emissions.

The next section briefly discusses climate change and global warming, and their adverse effects. The third section is devoted to the discussion of aviation's contribution toward accelerating climate change and global warming. The fourth section deals with the effects of climate change and global warming on aviation. The final section provides a conclusion to this chapter.

### **2.2 Climate change and global warming**

Literally, climate change can be defined as “[a]ny natural or induced change in climate, either globally or in a particular area”.<sup>1</sup> According to the *United Nations Framework Convention on Climate Change* [UNFCCC], climate change denotes “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.”<sup>2</sup> This definition differs from the one used by the Intergovernmental Panel on Climate Change [IPCC],<sup>3</sup> the leading international scientific and intergovernmental body established by the United Nations Environment Programme and the World Meteorological Organization.<sup>4</sup> Climate change in the usage of the IPCC refers to:

[A] change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.<sup>5</sup>

---

<sup>1</sup> Chris Park, *A Dictionary of Environment and Conservation*, 1st ed (Oxford: Oxford University Press, 2007) *sub verbo* “climate change”.

<sup>2</sup> *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, Can TS 1994 No 7, art 1(2) (entered into force 21 March 1994) [UNFCCC].

<sup>3</sup> See The Core Writing Team [Lenny Bernstein et al], Rajendra K Pachauri & Andy Reisinger, eds, *Climate Change 2007: Synthesis Report: A Report of the Intergovernmental Panel on Climate Change* (Geneva: IPCC, 2008) at 30 [IPCC, *Synthesis Report 2007*].

<sup>4</sup> See Intergovernmental Panel on Climate Change, “Organization”, online: IPCC <[www.ipcc.ch/organization/organization.shtml](http://www.ipcc.ch/organization/organization.shtml)>.

<sup>5</sup> IPCC, *Synthesis Report 2007*, *supra* note 3 at 30.

The term “climate” denotes average weather.<sup>6</sup> Nevertheless, climate should not be confused with weather; they are closely related but different. While the chaotic nature of weather makes it unpredictable beyond a few days, predicting changes in climate is a very different and much more manageable issue.<sup>7</sup> An analogy can be drawn between age of animal and weather. Like weather, it cannot be predicted when an animal will die. However, it is possible to determine both average weather (climate) and average age of death of a particular species of animal and the change of such average.<sup>8</sup>

The term “global warming” can be traced back to at least the mid-1970s,<sup>9</sup> and can be defined as an “increase in the temperature of the troposphere, which has occurred in the past as a result of natural processes but is now believed to be accelerating as a result of increased emissions of greenhouse gases associated with the burning of fossil fuels.”<sup>10</sup> The fourth assessment report of the IPCC states that “[s]everal of the major greenhouse gases occur naturally but increases in their atmospheric concentrations over the last 250 years are due largely to human activities.”<sup>11</sup> Similarly, the latest fifth assessment report asserts that “[h]uman influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent

---

<sup>6</sup> See Hervé Le Treut et al, “Historical Overview of Climate Change Science” in Susan Solomon et al, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 93 at 104. See also Emily Boyd & Emma L Tompkins, *Climate Change: A Beginner’s Guide* (Oxford: Oneworld Publications, 2009) at 10.

<sup>7</sup> See Le Treut, *supra* note 6 at 104.

<sup>8</sup> See e.g. *ibid.*

<sup>9</sup> See Mark B Weldon, *Fundamentals of Practical Environmentalism* (Boca Raton, Fla: CRC Press, 2011) at 151 (CRCnetBASE).

<sup>10</sup> Park, *supra* note 1, *sub verbo* “global warming”. See also Piers Forster et al, “Changes in Atmospheric Constituents and in Radiative Forcing” in Susan Solomon et al, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 129 at 135:

Human activities contribute to climate change by causing changes in Earth’s atmosphere in the amounts of greenhouse gases, aerosols (small particles), and cloudiness. The largest known contribution comes from the burning of fossil fuels, which releases carbon dioxide gas to the atmosphere. Greenhouse gases and aerosols affect climate by altering incoming solar radiation and outgoing infrared (thermal) radiation that are part of Earth’s energy balance. Changing the atmospheric abundance or properties of these gases and particles can lead to a warming or cooling of the climate system. Since the start of the industrial era (about 1750), the overall effect of human activities on climate has been a warming influence. The human impact on climate during this era greatly exceeds that due to known changes in natural processes, such as solar changes and volcanic eruptions.

<sup>11</sup> Susan Solomon et al, “Technical Summary” in Susan Solomon et al, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 19 at 23 [Solomon, “Technical”].

climate changes have had widespread impacts on human and natural systems.”<sup>12</sup>

The *UNFCCC* defines greenhouse gases as “those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation.”<sup>13</sup> Anthropogenic emissions produce four principal greenhouse gases, namely, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and the halocarbons (a group of gases containing fluorine, chlorine and bromine), which accumulate in the atmosphere, causing concentrations to increase with time.<sup>14</sup> The atmospheric concentrations of all of these gases have significantly increased since the beginning of the Industrial Revolution in 1750;<sup>15</sup> their concentrations have “increased to levels unprecedented in at least the last 800,000 years”.<sup>16</sup>

Scientists expect that global warming will change climate in a number of ways:

[C]old seasons are likely to become shorter and warm ones to become longer. Northern latitudes are likely to have wetter autumns and winters, and drier springs and summers. There would be more rainfall in the tropics, and subtropical areas could become drier. Global warming is likely to cause shifts in the main climate zones around the world, and this will probably bring a rise in the frequency and intensity of floods, droughts, typhoons, tornadoes, and hurricanes in many areas. This would further aggravate the losses and hardships caused by sea level rise.<sup>17</sup>

Weldon enunciates the theory of global warming in the following way:

We humans are burning too much fossil fuel and liberating vast amounts of carbon dioxide (CO<sub>2</sub>) into the atmosphere. The CO<sub>2</sub> acts like a one-way heat filter in that it allows sunlight to pass freely from outer space into our atmosphere but prevents heat from the planet from reradiating freely into space. Other atmospheric gases, some natural and some man-made, also exhibit this property. Scientists tell us that, without the heat-filtering processes of these gases, the [E]arth’s average temperature would be approximately 30° Fahrenheit (15° Celsius) cooler[.]<sup>18</sup>

It is worth noting that scientists often use the term “climate change” in lieu of “global

---

<sup>12</sup> The Core Writing Team [Rajendra K Pachauri et al], Rajendra K Pachauri & Leo Meyer, eds, *Climate Change 2014: Synthesis Report: Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva: IPCC, 2015) at 2 [IPCC, *Synthesis Report 2014*].

<sup>13</sup> *UNFCCC*, *supra* note 2, art 1(5).

<sup>14</sup> See Forster et al, *supra* note 10 at 135.

<sup>15</sup> See *ibid*. The industrial era commenced in 1750. See Thomas F Stocker et al, “Technical Summary” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 33 at 53.

<sup>16</sup> IPCC, “Summary for Policymakers” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 3 at 11 [IPCC, “Summary: Physical Science 2013”].

<sup>17</sup> Park, *supra* note 1, *sub verbo* “global warming”.

<sup>18</sup> Weldon, *supra* note 9 at 151.

warming”, since, due to the rise of the Earth’s average temperature, “winds and ocean currents move heat around the globe in ways that can cool some areas, warm others, and change the amount of rain and snow falling”.<sup>19</sup> As a consequence, “the climate changes differently in different areas”.<sup>20</sup> Weldon, though argues that climate change is a “pseudonym” for global warming, states that the term climate change is broader than the term global warming.<sup>21</sup> Weldon notes:

[C]limate change is a much broader term than global warming. It is not restricted to merely an increase in temperature. Climate change can include increased frequency and severity of droughts, floods, hurricanes, and blizzards. It can even include cooling temperatures in certain parts of the world. Climate change is a very inclusive and convenient term that allows humanity to accept responsibility for all sorts of weather events. This broader definition allows us to increase the size and scope of the issue and the upcoming catastrophe if we wish. It is also a way to hedge our bet and grant us an escape clause just in case the predicted temperature changes do not materialize as we expect. Taken to extremes, the inclusiveness of the term climate change basically allows any weather outcome to be promoted as resulting from humanity’s impact upon the global climate.<sup>22</sup>

Some effects of global warming are already in place: ice is melting worldwide, especially at the Earth’s poles, sea level rise has become faster over the last century, and precipitation (rain and snowfall) has increased across the globe, on average.<sup>23</sup> Bill Fraser has tracked the decline of the Adélie penguins on Antarctica; their numbers have fallen from 32,000 breeding pairs to 11,000 in 30 years.<sup>24</sup> Furthermore, some butterflies, foxes, and alpine plants have moved farther north or to higher, cooler areas, and spruce bark beetles have boomed in Alaska thanks to 20 years of warm Summers,<sup>25</sup> chewing up 4 million acres of spruce trees.<sup>26</sup> According to the World Health Organization, climate change is “estimated to cause over 150,000 death annually”,<sup>27</sup> and will cause, it is predicted, approximately 250,000 additional deaths per year between 2030 and 2050,

---

<sup>19</sup> “What Is Global Warming?: The Planet Is Heating Up—and Fast”, *National Geographic*, online: National Geographic <[environment.nationalgeographic.com/environment/global-warming/gw-overview](http://environment.nationalgeographic.com/environment/global-warming/gw-overview)> [“What Is Global Warming”]. See also Weldon, *supra* note 9 at 151–52.

<sup>20</sup> “What Is Global Warming”, *supra* note 19.

<sup>21</sup> Weldon, *supra* note 9 at 152.

<sup>22</sup> *Ibid.*

<sup>23</sup> See “Effects of Global Warming: Signs Are Everywhere”, *National Geographic*, online: National Geographic <[environment.nationalgeographic.com/environment/global-warming/gw-effects/](http://environment.nationalgeographic.com/environment/global-warming/gw-effects/)> [“Effects of Global Warming”].

<sup>24</sup> See *ibid.*

<sup>25</sup> See *ibid.*

<sup>26</sup> See *ibid.*

<sup>27</sup> The Health and Environment Linkages Initiative (HELI), “Climate Change”, online: World Health Organization <[www.who.int/heli/risks/climate/climatechange/en/](http://www.who.int/heli/risks/climate/climatechange/en/)>.

from malnutrition, malaria, diarrhea, and heat stress.<sup>28</sup> If global warming continues at its current pace, the following effects could occur later this century:

- Sea levels are expected to rise between 7 and 23 inches (18 and 59 centimeters) by the end of the century, and continued melting at the poles could add between 4 and 8 inches (10 to 20 centimeters).
- Hurricanes and other storms are likely to become stronger.
- Species that depend on one another may become out of sync. For example, plants could bloom earlier than their pollinating insects become active.
- Floods and droughts will become more common. Rainfall in Ethiopia, where droughts are already common, could decline by 10 percent over the next 50 years.
- Less fresh water will be available. If the Quelccaya ice cap in Peru continues to melt at its current rate, it will be gone by 2100, leaving thousands of people who rely on it for drinking water and electricity without a source of either.
- Some diseases will spread, such as malaria carried by mosquitoes.
- Ecosystems will change—some species will move farther north or become more successful; others [will not] be able to move and could become extinct. Wildlife research scientist Martyn Obbard has found that since the mid-1980s, with less ice on which to live and fish for food, polar bears have gotten considerably skinnier. Polar bear biologist Ian Stirling has found a similar pattern in Hudson Bay. He fears that if sea ice disappears, the polar bears will as well.<sup>29</sup>

### **2.3 The contribution of aviation to climate change and global warming**

Aviation significantly contributes to climate change and global warming through emissions of gases and particles from aircraft, ground support services (airport access vehicles, ground support vehicles, etc.), auxiliary power units providing electricity and air conditioning to aircraft parked at airport terminal gates, stationary airport power sources, construction equipment operating at the airport, etc.<sup>30</sup> Concern over aviation's such contribution is mounting due to the fact that the aviation industry and related activities are growing rapidly outpacing technological innovation in this field toward reducing emissions from aviation.<sup>31</sup> Both civil and military aviation

---

<sup>28</sup> See World Health Organization, *Climate Change and Health*, Fact sheet No 266 (Reviewed August 2014), online: World Health Organization <[www.who.int/mediacentre/factsheets/fs266/en/](http://www.who.int/mediacentre/factsheets/fs266/en/)>.

<sup>29</sup> "Effects of Global Warming", *supra* note 23.

<sup>30</sup> See IPCC, "Summary for Policymakers: Aviation and the Global Atmosphere" in Joyce E Penner et al, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999) 1 at 3 [IPCC, "Summary: Aviation"]; World Bank, *Air Transport and Energy Efficiency*, Transport Papers, TP – 38 (February 2012) at 31–32, online: World Bank <[siteresources.worldbank.org/INTAIRTRANSPORT/Resources/TP38.pdf](http://siteresources.worldbank.org/INTAIRTRANSPORT/Resources/TP38.pdf)>.

<sup>31</sup> See e.g. *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A38-18, 38th Sess, ICAO Doc 10022, I-68 at I-68, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)> [ICAO Res A38-18]; Paul Stephen Dempsey, *Public International Air Law* (Montreal: McGill University, Institute and Center for Research in Air & Space Law, 2008) at

are expanding and contaminating the environment accelerating climate change and global warming. Civil aviation is growing at a faster pace than military aviation and, consequently, the former would be more responsible for aviation's environmental impacts than the latter.<sup>32</sup> Again, emissions from international civil aviation is higher than domestic civil aviation since the former consumes more fuel than the latter.<sup>33</sup> It is estimated that passenger traffic (both domestic and international) will grow at an average rate of 4.9 percent per year over the 2010–2030 period.<sup>34</sup> During the 2030–2040 period, traffic growth is “expected to moderate to an average of 4.0% per annum”.<sup>35</sup> World air freight traffic is “expected to grow at an average annual growth rate of 5.2% from 2010 to 2030, and at 4.6% between 2030 and 2040”.<sup>36</sup> The International Civil Aviation Organization [ICAO] has forecasted that “the number of aircraft operations worldwide will triple by 2040”.<sup>37</sup>

Aircraft emit gases and particles directly into the upper troposphere, the only human enterprise to do so,<sup>38</sup> and lower stratosphere which affect atmospheric composition by, *inter alia*, altering the concentration of atmospheric greenhouse gases, prompting formation of condensation trails, called contrails,<sup>39</sup> and increasing cirrus cloudiness.<sup>40</sup> All these effects of emissions from

---

400; ICAO Secretariat, “Aviation Outlook Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 18 at 18; IPCC, “Summary: Aviation”, *supra* note 30 (“[t]otal aviation emissions have increased, because increased demand for air transport has outpaced the reductions in specific emissions from the continuing improvements in technology and operational procedures” at 3 [footnote omitted]); World Bank, *supra* note 30 at 31.

<sup>32</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 4, n 6: “The historical breakdown of aviation fuel burn for civil (passenger plus cargo) and military aviation was 64 and 36%, respectively, in 1976, and 82 and 18%, respectively, in 1992. These are projected to change to 93 and 7%, respectively, in 2015, and to 97 and 3%, respectively, in 2050.”

<sup>33</sup> In 2010, approximately 65 percent of global aviation fuel consumption (approximately 142 million metric tons of fuel) was from international civil aviation resulting in an estimated 448 million metric tons of CO<sub>2</sub> emissions. International civil aviation's fuel consumption is expected to grow to nearly 70 percent by 2050. See Gregg Fleming & Urs Ziegler, “Environmental Trends in Aviation to 2050” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 22 at 22, 25.

<sup>34</sup> ICAO Secretariat, “Air Traffic and Fleet Forecasts” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 18 at 18.

<sup>35</sup> *Ibid.*

<sup>36</sup> *Ibid* at 19.

<sup>37</sup> *Ibid* at 21.

<sup>38</sup> See Dempsey, *supra* note 31 at 400. According to the IPCC, aviation emissions are “the predominant anthropogenic emissions deposited directly into the upper troposphere and lower stratosphere.” IPCC, “Summary: Aviation”, *supra* note 30 at 3.

<sup>39</sup> Aircraft emitted water vapor trigger the formation of contrails which “tend to warm the Earth's surface, similar to thin high clouds.” IPCC, “Summary: Aviation”, *supra* note 30 at 7.

<sup>40</sup> See *ibid* at 3. See also Michael Prather et al, “Potential Climate Change from Aviation” in Joyce E Penner et al, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999) 185 at 187: “Atmospheric changes from aircraft result from three types of

aircraft engine contribute to climate change and global warming.<sup>41</sup> Since much of aviation's emissions occur at the upper atmosphere causing greater damage to the atmosphere than caused by other sources of emissions and since the industry is rapidly growing, inaction to reduce emissions from aviation would undermine efforts from other sectors to tackle climate change and global warming.<sup>42</sup> Aircraft emissions of relevance to climate change and global warming include:<sup>43</sup>

- carbon dioxide (CO<sub>2</sub>) (around 70 percent of total emissions),<sup>44</sup>
- water vapor (H<sub>2</sub>O) (around 30 percent of total emissions),<sup>45</sup>
- nitric oxide (NO) (less than 1 percent of total emissions),<sup>46</sup>
- nitrogen dioxide (NO<sub>2</sub>) (less than 1 percent of total emissions),<sup>47</sup>
- sulfur oxides (SO<sub>x</sub>O) (less than 1 percent of total emissions),<sup>48</sup> and
- soot.<sup>49</sup>

Carbon dioxide (CO<sub>2</sub>) and water vapor are greenhouse gases. As one of the long-lived or well-mixed greenhouse gases,<sup>50</sup> CO<sub>2</sub> is chemically stable, has a long atmospheric residence time and, consequently, it admixes throughout the atmosphere much faster than it is removed.<sup>51</sup> CO<sub>2</sub> is

---

processes: direct emission of radiatively active substances (e.g., CO<sub>2</sub> or water vapor); emission of chemical species that produce or destroy radiatively active substances (e.g., NO<sub>x</sub>, which modifies O<sub>3</sub> concentration); and emission of substances that trigger the generation of aerosol particles or lead to changes in natural clouds (e.g., contrails)."

<sup>41</sup> See IPCC, "Summary: Aviation", *supra* note 30 at 3.

<sup>42</sup> See also Dieter Helm, "Climate-change Policy: Why has so Little been Achieved?" in Dieter Helm & Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009) 9 at 17.

<sup>43</sup> See also ICAO, "Contaminants", online: ICAO <[www.icao.int/environmental-protection/Pages/Contaminants.aspx](http://www.icao.int/environmental-protection/Pages/Contaminants.aspx)> [ICAO, "Contaminants"].

<sup>44</sup> See World Bank, *supra* note 30 at 31.

<sup>45</sup> See *ibid.*

<sup>46</sup> See e.g. *ibid.*

<sup>47</sup> Nitric oxide and nitrogen dioxide are jointly termed nitrogen oxides (NO<sub>x</sub>). See also World Bank, *supra* note 30 at 31.

<sup>48</sup> See World Bank, *supra* note 30 at 31.

<sup>49</sup> See IPCC, "Summary: Aviation", *supra* note 30 at 3.

<sup>50</sup> Long-lived greenhouse gases, e.g., CO<sub>2</sub>, methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), "are chemically stable and persist in the atmosphere over time scales of a decade to centuries or longer, so that their emission has a long-term influence on climate. Because these gases are long lived, they become well mixed throughout the atmosphere much faster than they are removed and their global concentrations can be accurately estimated from data at a few locations." Solomon, "Technical", *supra* note 11 at 23–24. The IPCC fifth assessment report uses the term "well-mixed" instead of "long-lived" greenhouse gases. See e.g. Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013).

<sup>51</sup> See Solomon, "Technical", *supra* note 11 at 23–24; IPCC, "Summary: Aviation", *supra* note 30 at 3; Drew Shindell et al, "Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security" (2012) 335:6065 *Science* 183 at 184.

considered as the most important anthropogenic greenhouse gas;<sup>52</sup> it does not have a specific lifetime due to the fact that “it is continuously cycled between the atmosphere, oceans and land biosphere and its net removal from the atmosphere involves a range of processes with different time scales”.<sup>53</sup> The atmospheric concentrations of CO<sub>2</sub> have “increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions.”<sup>54</sup> At present, civil aviation accounts for approximately 2 percent of total global CO<sub>2</sub> emissions.<sup>55</sup> Aviation is responsible for 12 percent of total CO<sub>2</sub> emissions from the transportation sector, compared to 74 percent from road transport,<sup>56</sup> and the CO<sub>2</sub> emissions from aviation are projected to grow to 23 percent by 2050 unless effective measures to curb such emissions are initiated.<sup>57</sup>

The other gases and particles emitted by aircraft have shorter atmospheric residence times and remain concentrated near flight routes.<sup>58</sup> These emissions can lead to radiative forcing that is regionally located near the flight routes for some components, e.g., ozone (O<sub>3</sub>) and contrails,<sup>59</sup> contrary to emissions that are globally mixed, e.g., CO<sub>2</sub> and methane (CH<sub>4</sub>).<sup>60</sup> Radiative forcing is defined as:

[T]he change in net (down minus up) irradiance (solar plus long-wave; in Wm<sup>-2</sup>) at the tropopause AFTER allowing for stratospheric temperatures to readjust to radiative equilibrium, but with surface and tropospheric temperatures and state held fixed at the unperturbed values[.]<sup>61</sup>

---

<sup>52</sup> See e.g. IPCC, “Summary for Policymakers” in Susan Solomon et al, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 1 at 2.

<sup>53</sup> Solomon, “Technical”, *supra* note 11 at 24. To learn more about CO<sub>2</sub> and the global carbon cycle, see Philippe Ciais et al, “Carbon and Other Biogeochemical Cycles” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 465 at 470–73.

<sup>54</sup> IPCC, “Summary: Physical Science 2013”, *supra* note 16 at 11.

<sup>55</sup> ICAO Res A38-18, *supra* note 31 at I-68; Air Transport Action Group, “Facts & Figures”, online: ATAG <[www.atag.org/facts-and-figures.html](http://www.atag.org/facts-and-figures.html)> (visited August 21, 2015) [ATAG, “Facts”]; ICAO Secretariat, “Climate Change Outlook” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 31 (“[t]otal aviation CO<sub>2</sub> emissions (domestic and international) are approximately 2% of the world’s anthropogenic (human-made) CO<sub>2</sub> emissions” at 31).

<sup>56</sup> See ATAG, “Facts”, *supra* note 55.

<sup>57</sup> See World Bank, *supra* note 30 at 31.

<sup>58</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 3.

<sup>59</sup> See World Bank, *supra* note 30 at 31–32.

<sup>60</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 3.

<sup>61</sup> V Ramaswamy et al, “Radiative Forcing of Climate Change” in JT Houghton et al, eds, *Climate Change 2001: The Scientific Basis: Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2011) 349 at 353. See also Forster et al, *supra* note 10 at 133:

Radiative forcing is used to assess and compare the anthropogenic and natural drivers of climate change. The concept arose from early studies of the climate response to changes in solar insolation and CO<sub>2</sub>, using simple radiative-convective models. However, it has proven to be particularly applicable for the assessment



Radiative forcing is “a simple measure for both quantifying and ranking the many different influences on climate change”.<sup>62</sup> Radiative forcing provides “a limited measure of climate change as it does not attempt to represent the overall climate response.”<sup>63</sup> Nonetheless, “as climate sensitivity and other aspects of the climate response to external forcings remain inadequately quantified”, radiative forcing has “the advantage of being more readily calculable and comparable than estimates of the climate response”.<sup>64</sup> Positive radiative forcing leads to surface warming and negative radiative forcing to surface cooling.<sup>65</sup> The fifth IPCC assessment report concludes that “[t]otal radiative forcing is positive, and has led to an uptake of energy by the climate system.”<sup>66</sup> It was found that “[t]he largest contribution to total radiative forcing is caused by the increase in the atmospheric concentration of CO<sub>2</sub> since 1750”.<sup>67</sup>

Aircraft-emitted nitrogen oxides (NO<sub>x</sub>), i.e. nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) jointly, participate in ozone chemistry expediting climate change and global warming.<sup>68</sup> Ozone, one of the greenhouse gases and one of the common air pollutants, is “continually produced and destroyed in the atmosphere by chemical reactions”.<sup>69</sup> Human activities have increased ozone in the troposphere “through the release of gases such as carbon monoxide, hydrocarbons and nitrogen oxide, which chemically react to produce ozone.”<sup>70</sup> Nonetheless, ozone protects the Earth’s surface from harmful ultraviolet (UV) radiation.<sup>71</sup> Aircraft emitted NO<sub>x</sub> more effectively produces ozone in the upper troposphere than do an equivalent amount of emissions at the surface.<sup>72</sup> In response to NO<sub>x</sub> increases, ozone in the upper troposphere and lower stratosphere – the flying zone of

---

of the climate impact of [long-lived greenhouse gases]... Radiative forcing can be related through a linear relationship to the global mean equilibrium temperature change at the surface ( $\Delta T_s$ ):  $\Delta T_s = \lambda \text{RF}$ , where  $\lambda$  is the climate sensitivity parameter... This equation, developed from these early climate studies, represents a linear view of global mean climate change between two equilibrium climate states.

<sup>62</sup> Forster et al, *supra* note 10 at 133.

<sup>63</sup> *Ibid.*

<sup>64</sup> *Ibid.*

<sup>65</sup> See IPCC, “Summary: Physical Science 2013”, *supra* note 16 at 13.

<sup>66</sup> *Ibid.*

<sup>67</sup> *Ibid.*

<sup>68</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 3. Ozone (O<sub>3</sub>) is “a significant greenhouse gas that is formed and destroyed by chemical reactions involving other species in the atmosphere. In the troposphere, the human influence on ozone occurs primarily through changes in precursor gases that lead to its formation”. However, in the stratosphere, “the human influence has been primarily through changes in ozone removal rates caused by chlorofluorocarbons (CFCs) and other ozone-depleting substances.” Solomon, “Technical”, *supra* note 11 at 24.

<sup>69</sup> Forster et al, *supra* note 10 at 135.

<sup>70</sup> *Ibid.*

<sup>71</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 3.

<sup>72</sup> See *ibid* at 6.

subsonic aircraft – is expected to increase, and methane (CH<sub>4</sub>),<sup>73</sup> one of the long-lived or well-mixed greenhouse gases,<sup>74</sup> is expected to decrease.<sup>75</sup> At higher altitudes, where the supersonic aircraft fly,<sup>76</sup> increases in NO<sub>x</sub> lead to decreases in the stratospheric ozone layer.<sup>77</sup> In these regions, ozone precursor (NO<sub>x</sub>) residence times “increase with altitude, and hence perturbations to ozone by aircraft depend on the altitude of NO<sub>x</sub> injection and vary from regional in scale in the troposphere to global in scale in the stratosphere.”<sup>78</sup>

Furthermore, aircraft-emitted water vapor, sulfur oxides that form sulfate particles, and soot play both direct and indirect roles in ozone chemistry.<sup>79</sup> Sulfur and water emissions from aircraft “in the stratosphere tend to deplete ozone, partially offsetting the NO<sub>x</sub>-induced ozone increases.”<sup>80</sup> Nevertheless, science has not developed an ability to quantify the degree of such increases and depletions of ozone and, hence, the impact of subsonic aircraft emissions on the stratospheric ozone needs further evaluation.<sup>81</sup>

Water vapor (H<sub>2</sub>O) is the most abundant and important greenhouse gas in the atmosphere.<sup>82</sup> Nevertheless, human activities have only a small direct influence on the amount of atmospheric water vapor; indirectly, humans have the potential to substantially affect water vapor by changing climate.<sup>83</sup> For example, a warmer atmosphere contains more water vapor.<sup>84</sup> Human activities also

---

<sup>73</sup> Methane (CH<sub>4</sub>) “has increased as a result of human activities related to agriculture, natural gas distribution and landfills. Methane is also released from natural processes that occur, for example, in wetlands. Methane concentrations are not currently increasing in the atmosphere because growth rates decreased over the last two decades.” Forster et al, *supra* note 10 at 135.

<sup>74</sup> See Solomon, “Technical”, *supra* note 11 at 23–24. To learn more, see Ciais et al, *supra* note 53.

<sup>75</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 3 (as well as “increasing tropospheric ozone concentrations, aircraft NO<sub>x</sub> emissions are expected to decrease the concentration of methane” – another greenhouse gas – and such “reductions in methane tend to cool the surface of the Earth” at 6).

<sup>76</sup> At present, there is no commercial supersonic aircraft. Concorde, which was withdrawn from service in October 24, 2003, was a commercial supersonic aircraft. Currently, only military aviation uses supersonic aircraft. See e.g. Bryony Jones, “Paris Air Show: Race to be first with ‘son of supersonic’”, *CNN* (21 June 2011), online: CNN <[www.cnn.com/2011/TECH/innovation/06/21/concorde.hyper.sonic/index.html](http://www.cnn.com/2011/TECH/innovation/06/21/concorde.hyper.sonic/index.html)>; Jerry S Lewis et al, “Aircraft Technology and Its Relation to Emissions” in Joyce E Penner et al, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999) 217 at 261–66; British Airways, “Celebrating Concorde”, online: British Airways <[www.britishairways.com/en-gb/information/about-ba/history-and-heritage/celebrating-concorde#flying](http://www.britishairways.com/en-gb/information/about-ba/history-and-heritage/celebrating-concorde#flying)>; “End of an era for Concorde”, *BBC News* (24 October 2003), online: BBC News <[news.bbc.co.uk/2/hi/uk\\_news/3211053.stm](http://news.bbc.co.uk/2/hi/uk_news/3211053.stm)>.

<sup>77</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 3.

<sup>78</sup> *Ibid.*

<sup>79</sup> See *ibid* at 4.

<sup>80</sup> *Ibid* at 6.

<sup>81</sup> See *ibid.*

<sup>82</sup> See Forster et al, *supra* note 10 at 135.

<sup>83</sup> See *ibid.*

<sup>84</sup> See *ibid.*

influence water vapor through methane (CH<sub>4</sub>) emissions, because CH<sub>4</sub> undergoes chemical destruction in the stratosphere, producing a small amount of water vapor.<sup>85</sup> Water vapor from subsonic aircraft is mostly emitted in the troposphere, and a small fraction of such emissions occur in the lower stratosphere.<sup>86</sup> While such emissions in the troposphere are rapidly removed by precipitation within 1 to 2 weeks, the smaller fraction of such emissions in the lower stratosphere can build up to larger concentrations leading to warming the surface of the Earth.<sup>87</sup> Nevertheless, for subsonic aircraft, this effect of water vapor on global warming is minimal compared to other aircraft emissions, e.g., CO<sub>2</sub> and nitrogen oxides (NO<sub>x</sub>).<sup>88</sup>

The actual effects of aircraft emitted contrails and aerosol on climate change and global warming are still unknown to the modern science.<sup>89</sup> Water vapor emitted by aircraft trigger the formation of contrails and the optical properties of contrails “depend on the particles emitted or formed in the aircraft plume and on the ambient atmospheric conditions.”<sup>90</sup> Nonetheless, the radiative effect of contrails relies on “their optical properties and global cover, both of which are uncertain.”<sup>91</sup> The contrails created by aircraft may also have an impact on the environment.<sup>92</sup> However, research is not conclusive about whether these have a net warming or cooling effect on the Earth.<sup>93</sup> Under some meteorological conditions, these can remain in the atmosphere and form cirrus clouds that may have an effect on climate change.<sup>94</sup> For example, some research suggests that cirrus clouds “may have different cooling and warming effects, depending on whether flights occur during the day or night.”<sup>95</sup> Research of this type “can identify whether there are any potential benefits to altering operational behavior.”<sup>96</sup> More work is being done in the area of aviation operations and the aviation industry is helping with “research into the effects of contrails on climate change, including putting high-altitude atmospheric testing equipment on some passenger aircraft”.<sup>97</sup>

---

<sup>85</sup> See *ibid.*

<sup>86</sup> See IPCC, “Summary: Aviation”, *supra* note 30 at 7.

<sup>87</sup> See *ibid.*

<sup>88</sup> See *ibid.*

<sup>89</sup> See Forster et al, *supra* note 10 at 186–88.

<sup>90</sup> IPCC, “Summary: Aviation”, *supra* note 30 at 7.

<sup>91</sup> *Ibid.*

<sup>92</sup> See World Bank, *supra* note 30 at 31–32.

<sup>93</sup> See *ibid* at 31.

<sup>94</sup> See *ibid.*

<sup>95</sup> *Ibid.*

<sup>96</sup> *Ibid* at 31–32.

<sup>97</sup> *Ibid* at 32.

Aerosols are “microscopic particles suspended in air”.<sup>98</sup> In aviation, examples of aerosols are airborne sulfate particles and soot particles.<sup>99</sup> While increases in soot tend to warm the Earth’s surface, increases in sulfate tend to cool the surface.<sup>100</sup> However, the direct radiative forcing of these aerosols from aircraft is “small compared to those of other aircraft emissions”.<sup>101</sup> Since aerosols shape “the formation of clouds, the accumulation of aerosols from aircraft *may* play a role in enhanced cloud formation and change the radiative properties of clouds.”<sup>102</sup>

Aviation is a small but significant contaminator.<sup>103</sup> Aviation would be the 17<sup>th</sup> largest emitter of CO<sub>2</sub> in 2010 if international civil aviation were a State.<sup>104</sup> The sector would be the 7<sup>th</sup> largest emitter of greenhouse gases if it were a State.<sup>105</sup> Aircraft and airports are significant polluters.<sup>106</sup> Aircraft emissions alter at different flight stages.<sup>107</sup> While major emissions from aircraft occur at higher altitudes, approximately 10 percent of all aircraft emissions, except hydrocarbons and carbon monoxide (CO), occur during airport ground level operations, and at landing and takeoff.<sup>108</sup> For CO and hydrocarbons, landing and takeoff operations make up 30 percent of emissions.<sup>109</sup> Additionally, automobile traffic to and from the airport can also contribute significantly to pollution.<sup>110</sup> ICAO has defined a specific reference landing and takeoff [LTO] cycle below a height of 3,000 ft above ground level.<sup>111</sup> This is referred to as mixing height, i.e.

---

<sup>98</sup> IPCC, “Summary: Aviation”, *supra* note 30 at 4, n 5.

<sup>99</sup> See *ibid.*

<sup>100</sup> See *ibid* at 8.

<sup>101</sup> *Ibid.*

<sup>102</sup> *Ibid* [emphasis added].

<sup>103</sup> See also DS Lee, LL Lim & B Owen, “Mitigating future aviation CO<sub>2</sub> emissions – “timing is everything”” (27 August 2013) at 2, online: Manchester Metropolitan University Dalton Research Institute <[www.cate.mmu.ac.uk/docs/mitigating-future-aviation-co2-emissions.pdf](http://www.cate.mmu.ac.uk/docs/mitigating-future-aviation-co2-emissions.pdf)>.

<sup>104</sup> See *ibid.*

<sup>105</sup> See International Coalition for Sustainable Aviation, *Effective Market-Based Measures to Address Greenhouse Gas Emissions from International Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 288, Doc A38-WP/288/Ex/100 (12 September 2013) at 2, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp288\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp288_en.pdf)>. The International Coalition for Sustainable Aviation, *ibid* at 2, further asserts that, “[t]aking into account the non-CO<sub>2</sub> effects of aircraft emissions (a critical issue that has fallen outside of ICAO’s current focus), aviation today accounts for around 5% of the total radiative forcing attributable to manmade activities.”

<sup>106</sup> See Dempsey, *supra* note 31 at 405; ICAO, “Contaminants”, *supra* note 43.

<sup>107</sup> See World Bank, *supra* note 30 at 32.

<sup>108</sup> See *ibid*; Travis M Norton, *Aircraft Greenhouse Gas Emissions during the Landing and Takeoff Cycle at Bay Area Airports* (Master’s Project, University of San Francisco, 2014) at 11 [unpublished].

<sup>109</sup> See Norton, *supra* note 108 at 11.

<sup>110</sup> See Dempsey, *supra* note 31 at 405; ICAO, “Contaminants”, *supra* note 43.

<sup>111</sup> See ICAO, *Airport Air Quality Manual*, 1st ed, ICAO Doc 9889 (2011) at 3-A1-2, online: ICAO <[www.icao.int/publications/Documents/9889\\_cons\\_en.pdf](http://www.icao.int/publications/Documents/9889_cons_en.pdf)>.

“the height of the vertical mixing of the lower troposphere”,<sup>112</sup> which extends to a height of approximately 3,000 ft.<sup>113</sup> While emissions below the mixing height have the potential to affect “local air quality concentrations”, emissions occurring closer to the ground have “possibly greater effects on ground level concentrations”.<sup>114</sup> Worth mentioning is the fact that “the overall climate impact of aviation is much greater than the impact of CO<sub>2</sub> alone.”<sup>115</sup> The effects of aircraft emitted nitrogen oxides (NO<sub>x</sub>) and other gases “are estimated to be about two to four times greater than those of aviation’s CO<sub>2</sub> alone, even without considering the potential impact of cirrus cloud enhancement.”<sup>116</sup>

#### **2.4 The effects of climate change and global warming on aviation**

The global aviation industry will not be able to escape the dire effects of climate change and global warming. The negative impacts of climate change and global warming will embrace the aviation industry no less than other sectors. As mentioned, it is likely that global warming will “cause shifts in the main climate zones around the world, and this will probably bring a rise in the frequency and intensity of floods, droughts, typhoons, tornadoes, and hurricanes in many areas.”<sup>117</sup> These weather events will cause more flight delays and cancellation. In the most recent past, several typhoons, tornadoes, and hurricanes have hit different regions of the world leading to thousands of flight cancellations and delays.<sup>118</sup> Such disruption of air services causes trouble and inconvenience to air travelers.<sup>119</sup> These stranded passengers also incur economic loss. Flight cancellations and delays caused by extraordinary weather events do not give rise to liability on the

---

<sup>112</sup> *Ibid* at 3-A1-2, n 2.

<sup>113</sup> *Ibid* at 3-A1-2.

<sup>114</sup> *Ibid*.

<sup>115</sup> Terry Barker et al, “Technical Summary” in Bert Metz et al, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 25 at 49.

<sup>116</sup> *Ibid*.

<sup>117</sup> Park, *supra* note 1, *sub verbo* “global warming”.

<sup>118</sup> See e.g. “Typhoon cancels dozens of flights in Japan”, *Japan Today* (26 July 2015), online: Japan Today <[www.japantoday.com/category/national/view/typhoon-cancels-dozens-of-flights-in-japan](http://www.japantoday.com/category/national/view/typhoon-cancels-dozens-of-flights-in-japan)>; Jason Hanna, “Typhoon Chan-hom slams eastern China’s Zhoushan city”, *CNN* (12 July 2015), online: CNN <[www.cnn.com/2015/07/11/asia/asia-weather-typhoon-chan-hom/index.html](http://www.cnn.com/2015/07/11/asia/asia-weather-typhoon-chan-hom/index.html)>; Catherine E Shoichet, “Tornadoes reported in Oklahoma, Kansas, Nebraska”, *CNN* (6 May 2015), online: CNN <[www.cnn.com/2015/05/06/us/midwest-severe-weather/index.html](http://www.cnn.com/2015/05/06/us/midwest-severe-weather/index.html)>; Ed Payne, “Winter storm dodges Atlanta, weighs down parts of North Carolina”, *CNN* (4 March 2015), online: CNN <[www.cnn.com/2015/02/26/us/winter-weather/index.html](http://www.cnn.com/2015/02/26/us/winter-weather/index.html)>.

<sup>119</sup> See e.g. EC, *Regulation (EC) No 261/2004 of the European Parliament and of the Council of 11 February 2004 establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, and repealing Regulation (EEC) No 295/91*, [2004] OJ, L 46/1.

part of the airlines,<sup>120</sup> thus leaving these passengers without any redress. However, it does not mean that those cancellations and delays cost airlines nothing. Air carriers still need to take certain actions, e.g., rescheduling the flight, rebooking the stranded passengers or giving ticket refund, that have economic consequences. Again, performing these actions is not easy and becomes very difficult, if not impossible, during peak travel seasons. Flight cancellations, therefore, cost both the airlines and the passengers. For example, the cancellation of thousands of flights in the wake of the winter storm in 2015 was expected to cost airlines and stranded passengers nearly US \$200 million.<sup>121</sup>

As noted before, the sea-level is “expected to rise between 7 and 23 inches (18 and 59 centimeters) by the end of the century, and continued melting at the poles could add between 4 and 8 inches (10 to 20 centimeters).”<sup>122</sup> This rise of sea-level threatens the existence of a significant number of major airports. In the United States alone, a dozen of major airports are vulnerable to sea-level rise-related flooding risks. These airports include: John F. Kennedy International Airport, LaGuardia, Newark Liberty International Airport, Ronald Reagan Washington National Airport, Miami International Airport, Philadelphia International Airport, Fort Lauderdale International Airport, Tampa International Airport, New Orleans Louis Armstrong International Airport, Honolulu International Airport, San Francisco International Airport, and Oakland International Airport.<sup>123</sup> Such flooding will not only interrupt air services but their frequency may require relocating the airport which is a massive economic endeavor.

## **2.5 Conclusion**

Aviation is a small but significant contributor to climate change and global warming. It is a small contributor since it is responsible for approximately 2 percent of global CO<sub>2</sub> emissions. However, it is a significant contributor since, if aviation sector were a State, the sector would be the 7<sup>th</sup> largest emitter of greenhouse gases and the 17<sup>th</sup> largest CO<sub>2</sub> emitter. Due to aviation’s

---

<sup>120</sup> See *Convention for the Unification of Certain Rules for International Carriage by Air*, 28 May 1999, 2242 UNTS 309, ICAO Doc 9740, art 19.

<sup>121</sup> See Charisse Jones, “Canceled flights cost airlines, fliers millions”, *USA TODAY* (2 February 2015), online: USA TODAY <[www.usatoday.com/story/travel/flights/2015/02/02/canceled-flights-cost-airlines-and-fliers-millions/22750345/](http://www.usatoday.com/story/travel/flights/2015/02/02/canceled-flights-cost-airlines-and-fliers-millions/22750345/)>.

<sup>122</sup> “Effects of Global Warming”, *supra* note 23.

<sup>123</sup> See Andrew Freedman, “U.S. Airports Face Increasing Threat From Rising Seas”, *Climate Central* (18 June 2013), online: Climate Central <[www.climatecentral.org/news/coastal-us-airports-face-increasing-threat-from-sea-level-rise-16126/](http://www.climatecentral.org/news/coastal-us-airports-face-increasing-threat-from-sea-level-rise-16126/)>.

significant contribution, it is essential to govern emissions from aviation.

In addition to this, several other factors necessitate immediate action from the air transport sector toward reducing such emissions. Those factors include: the rapid growth of aviation industry and aviation related activities outpacing technological reductions in emissions;<sup>124</sup> the fact that aviation is the only human enterprise to emit pollutants directly into the upper troposphere and lower stratosphere;<sup>125</sup> disruption of air transport services and facilities due to natural disasters caused by climate change that costs both the airlines and the passengers; the proverb “prevention is better than cure”;<sup>126</sup> and the need to combat climate change and global warming globally, simultaneously, and collectively by all the sectors so that one sector’s inaction do not frustrate efforts from other sectors. Again, such global action is necessary since climate change and global warming are global problems which require a global solution.

---

<sup>124</sup> See e.g. Dempsey, *supra* note 31 at 413–14.

<sup>125</sup> See *ibid* at 400; IPCC, “Summary: Aviation”, *supra* note 30 at 3.

<sup>126</sup> The fifth IPCC assessment report states:

Substantial emissions reductions over the next few decades can reduce climate risks in the 21st century and beyond, increase prospects for effective adaptation, reduce the costs and challenges of mitigation in the longer term and contribute to climate-resilient pathways for sustainable development.

IPCC, *Synthesis Report 2014*, *supra* note 12 at 17. See also Dempsey, *supra* note 31 (“[t]he long-term cost of inaction with regard to prevention of climate change will most probably be far surpassed by the cost of cure” at 411 [footnote omitted]); Nicholas Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007); Ottmar Edenhofer et al, “The Atmosphere as a Global Commons – Challenges for International Cooperation and Governance”, Discussion Paper 13-58, The Harvard Project on Climate Agreements (August 2013) at 20, online: Harvard University Belfer Center for Science and International Affairs <belfercenter.ksg.harvard.edu/publication/23364/atmosphere\_as\_a\_global\_commonschallenges\_for\_international\_cooperation\_and\_governance.html?breadcrumb=%2Fproject%2F56%2Fharvard\_project\_on\_climate\_agreements%3Fgroupby%3D0%26parent\_id%3D%26page\_id%3D211%26filter%3D2013>.

## **Chapter 3: Existing and Envisaged Measures to Govern**

### **Emissions from Aviation that Contribute to Climate Change and Global Warming**

#### **3.1 Introduction**

The preceding chapter has demonstrated that emissions from international civil aviation that contribute to climate change and global warming have to be governed without further delay. Several measures of legal, technical, and/or economic nature to reduce such emissions have already been initiated globally, regionally, and nationally. And, a number of new measures is currently in the pipeline. This chapter provides an overview of these existing and envisaged measures. However, attention is placed on emissions from international civil aviation since the issue of emissions from domestic civil aviation is beyond the remit of this thesis.

It should be noted that legal instruments, which occupy the most important position in any governance initiative, have frequently been used to provide for and give effect to such measures. Among other things, legal instruments are often used to establish governance structures, and their effective implementation is one of the means to ensure successful governance in any area. For example, the *United Nations Framework Convention on Climate Change* [UNFCCC]<sup>1</sup> created the UNFCCC negotiations process that has essentially been climate change governance at the global level.<sup>2</sup> Again, in the terms of liberal institutionalism, which is regarded as the “mainstream position in the study of international environmental cooperation”,<sup>3</sup> “governance is embedded in the ‘laws and policies that regulate behavior as well as the institutions that facilitate the adoption and implementation of them’”.<sup>4</sup> In this chapter, the discussion of existing and envisaged measures to tackle climate change and global warming, therefore, concentrates on the effectiveness of the legal instruments used to provide for and give effect to these measures.

The next section briefly discusses existing and envisaged global or multilateral measures

---

<sup>1</sup> *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, Can TS 1994 No 7 (entered into force 21 March 1994) [UNFCCC].

<sup>2</sup> See Matthew J Hoffmann, “Global Climate Change” in Robert Falkner, ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013) 3 at 7–8.

<sup>3</sup> John Vogler, “Mainstream Theories: Realism, Rationalism and Revolutionism” in Paul G Harris, ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014) 30 at 35.

<sup>4</sup> Lorraine Elliott, *The Global Politics of the Environment*, 2nd ed (New York: New York University Press, 2004) at 94.



to regulate emissions from international civil aviation. The third section addresses existing unilateral environmental measures to govern aircraft engine emissions. The final section provides a conclusion to this chapter.

### **3.2 Global measures to govern emissions contributing to climate change and global warming**

This section addresses the existing and envisaged multilateral measures to combat climate change and global warming. In this respect, this section is divided into two subsections: the first subsection deals with the measures that are applicable to all sectors; and the second subsection concerns the measures adopted in the aviation sector to regulate emissions from international civil aviation.

#### **3.2.1 Existing and envisaged global measures to mitigate climate change and global warming: general**

International law regarding climate change is one of the three branches of international environmental law on the protection of the atmosphere and has emerged during the last development stage of international environmental law.<sup>5</sup> The other two branches are transboundary air pollution and ozone depletion.<sup>6</sup> The development of international environmental law is commonly divided into three stages.<sup>7</sup> During the first stage that pre-dates the 1972 Stockholm Conference on the Human Environment that produced the *Stockholm Declaration* and an Action Programme,<sup>8</sup> environmental costs and benefits were considered incidental to chiefly economic concerns, such as the exploitation of living natural resources.<sup>9</sup> During the second stage, a significant rise in the number of treaties directed to pollution abatement and to species and habitat

---

<sup>5</sup> See Catherine Redgwell, “International Environmental Law” in Malcolm D Evans, ed, *International Law*, 3rd ed (New York: Oxford University Press, 2010) 687 at 687–92 (“[t]here are three principal areas of international regulatory activity in respect of protection of the atmosphere – transboundary air pollution, ozone depletion, and global warming [or climate change]” at 701) [Redgwell, “International”]. See also Ian H Rowlands, “Atmosphere and Outer Space” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 315 at 316ff; Patricia Birnie, Alan Boyle & Catherine Redgwell, *International Law and the Environment*, 3rd ed (New York: Oxford University Press, 2009) at 335ff.

<sup>6</sup> See Redgwell, “International”, *supra* note 5 at 701.

<sup>7</sup> See *ibid* at 687, 690.

<sup>8</sup> *Declaration of the United Nations Conference on the Human Environment*, 16 June 1972, 11 ILM 1416, online: UNEP <[www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503](http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503)> [*Stockholm Declaration*].

<sup>9</sup> See Redgwell, “International”, *supra* note 5 at 687, 690.

conservation, yet largely reactive and piecemeal in nature, can be observed.<sup>10</sup> This stage commenced with the creation of international institutions from 1945 and saw its culmination in the 1972 Stockholm Conference.<sup>11</sup> The third and final stage that characterizes existing international environmental law “demonstrates a precautionary approach to environmental problems of global magnitude such as biodiversity conservation and *climate change*.”<sup>12</sup> This stage “witnesses instruments adopting a holistic approach to environmental protection and seeks to marry such protection with economic development, embraced in the concept of sustainable development.”<sup>13</sup> This was the theme of the 1992 Rio Conference on Environment and Development that produced the *Rio Declaration* and *Agenda 21*,<sup>14</sup> a program of action for the 21<sup>st</sup> Century covering many issues including climate change, for the realization of the principles of the *Rio Declaration*.<sup>15</sup> The Rio Conference also witnessed the conclusion of two major environmental treaties, namely, the *Convention on Biological Diversity*,<sup>16</sup> and the *UNFCCC*,<sup>17</sup> under the auspices of the United Nations [UN].<sup>18</sup>

In fact, while the climate change issue has been on “a number of different scientific agendas for over a century, substantial legal attention was not directed to the issue until the mid-1980s.”<sup>19</sup> Eventually, the issue became rooted in the UN system at the end of 1990 when the UN General Assembly established the Intergovernmental Negotiating Committee for the *UNFCCC* that met and debated over a period of 15 months and finally adopted the Convention.<sup>20</sup> The *UNFCCC* and

---

<sup>10</sup> See *ibid*.

<sup>11</sup> See *ibid* at 690.

<sup>12</sup> *Ibid* at 687 [emphasis added].

<sup>13</sup> *Ibid* at 691.

<sup>14</sup> *Rio Declaration on Environment and Development*, UN Doc A/CONF.151/5/Rev.1 (1992), 31 ILM 874, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163)> [*Rio Declaration*]; “Agenda 21” in *Report of the United Nations Conference on Environment and Development*, vol 1, Resolutions adopted by the Conference, Annex II, UN Doc A/CONF.151/26/Rev.1 (1993) 12, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=52](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=52)>.

<sup>15</sup> See Paul Stephen Dempsey, *Public International Air Law* (Montreal: McGill University, Institute and Center for Research in Air & Space Law, 2008) at 448; Birnie, Boyle & Redgwell, *supra* note 5 at 52 (“[a]lthough not legally binding[, *Agenda 21*] is potentially relevant to interpretation of treaties and other instruments adopted in accordance with its provisions” at 52). *Agenda 21* “recognizes the expertise of the United Nations specialized agencies and calls upon them to adopt a key role in their field of competence. Therefore, this represented a mandate for ICAO to further its work on global air pollution and climate change.” Dempsey, *ibid* at 448 [footnote omitted].

<sup>16</sup> *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79, Can TS 1993 No 24 (entered into force 29 December 1993).

<sup>17</sup> *UNFCCC*, *supra* note 1.

<sup>18</sup> See Redgwell, “International”, *supra* note 5 at 691.

<sup>19</sup> Rowlands, *supra* note 5 at 327.

<sup>20</sup> See *ibid* at 327–28.

the *Kyoto Protocol*<sup>21</sup> to the same Convention are the existing global measures to combat climate change and global warming. From a legal perspective, these two legal instruments are together considered “the backbone” of the current climate change governance system at the global level.<sup>22</sup> The *UNFCCC* and the *Kyoto Protocol* are discussed below.

### **3.2.1.1 Global climate change regime**

#### **A. United Nations Framework Convention on Climate Change**

In the Preamble to the *UNFCCC*, a number of principles, most of which are considered “emerging principles”,<sup>23</sup> in the field of international environmental law are acknowledged, recalled, recognized, and reaffirmed. The Parties to the *UNFCCC* acknowledged climate change and its adverse effects as “common concern of humankind”.<sup>24</sup> The Parties recalled the *Stockholm Declaration*,<sup>25</sup> the *Vienna Convention*,<sup>26</sup> and the *Montreal Protocol to the Vienna Convention*.<sup>27</sup> They also recalled the established customary international law principle that States have a sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and have the simultaneous responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.<sup>28</sup> The *UNFCCC* reaffirms the principle of sovereignty

---

<sup>21</sup> *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 162 (entered into force 16 February 2005) [*Kyoto Protocol*].

<sup>22</sup> Thomas Bernauer & Lena Maria Schaffer, “Climate Change Governance” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 441 at 442.

<sup>23</sup> For a concise but good discussion on the principles, see Ian Brownlie, *Principles of Public International Law*, 7th ed (New York: Oxford University Press, 2008) at 275–80. However, Birnie, Boyle and Redgwell argue that these principles “may lack the supposedly harder edge of a ‘rule’ or ‘obligation’, but they should not be confused with ‘non-binding’ or emerging law.” Birnie, Boyle & Redgwell, *supra* note 5 at 28. They further argue that “[w]hile the status of all of these principles in customary law is doubtful or disputer, they have nevertheless become important modifiers of existing rules and treaties, or influenced the negotiation and elaboration of treaty regimes. They are too important for courts, governments, or international organizations and treaty bodies to ignore.” *Ibid* at 38.

<sup>24</sup> *UNFCCC*, *supra* note 1, Preamble.

<sup>25</sup> *Stockholm Declaration*, *supra* note 8.

<sup>26</sup> *Vienna Convention for the Protection of the Ozone Layer*, 22 March 1985, 1513 UNTS 293, Can TS 1988 No 23 (entered into force 22 September 1988) [*Vienna Convention*].

<sup>27</sup> *Montreal Protocol on Substances that Deplete the Ozone Layer*, 16 September 1987, 1522 UNTS 3, Can TS 1989 No 42 (entered into force 1 January 1989) [*Montreal Protocol*].

<sup>28</sup> *UNFCCC*, *supra* note 1, Preamble. This sovereign right of States to exploit their own resources pursuant to their own environmental and developmental policies, and, simultaneously, the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction is also recognized under Principle 21 of *Stockholm Declaration* and Principle 2 of *Rio Declaration*. See *Stockholm Declaration*, *supra* note 8, Principle 21; *Rio Declaration*, *supra* note 14, Principle 2. This principle “is related to the obligation of all states ‘to protect within the territory the rights of other states, in particular their right to integrity and inviolability in peace and war’.” Philippe Sands et al, *Principles of*

of States in international cooperation to address climate change, and determines to protect the climate system for present and future generations,<sup>29</sup> i.e. intergenerational equity. The Parties to the Convention recognized, *inter alia*:

- that States should enact effective environmental legislation;
- the need for developed States to take immediate action that takes into account:
  - (a) all greenhouse gases, and
  - (b) the special circumstances of States, especially developing, which are vulnerable to the adverse effects of climate change, economies of which are dependent on fossil fuel production, use and exportation and, as a consequence of action taken on limiting greenhouse gas emissions, which will face special difficulties; and
- the need of all States, especially developing, to have access to resources required to achieve sustainable social and economic development.<sup>30</sup>

The objective of the *UNFCCC* is to *stabilize* “greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”.<sup>31</sup> The objective “should be achieved within a time frame sufficient to allow ecosystems

---

*International Environmental Law*, 3rd ed (New York: Cambridge University Press, 2012) at 196 [footnotes omitted]; *The Island of Palmas Case (or Miangas) (United States v Netherlands)* (1928), 11 RIAA 829 at 839 (Permanent Court of Arbitration) (Arbitrator: M Huber). This obligation of States was subsequently relied upon and elaborated in the famous *Trail Smelter* arbitration where it was held that the principles of international law do not grant any State “the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.” *Trail Smelter Arbitration (United States v Canada)* (1938), 3 RIAA 1905 at 1965, reprinted in 33 AJIL 182 (Arbitrators: Charles Warren, Robert AE Greenshields, Jan Frans Hostie). See also David M Ong, “International legal efforts to address human-induced global climate change” in Malgosia Fitzmaurice, David M Ong & Panos Merkouris, eds, *Research Handbook on International Environmental Law* (Cheltenham, UK: Edward Elgar, 2010) 450 (“[w]ithin international environmental law, apart from a specific breach of the Climate Change Convention regime, States are subject to the universal notion of State responsibility for transboundary environmental harm (*Trail Smelter Arbitration*, 1941)” at 452 [emphasis in original]). The International Court of Justice, in the *Legality of the Threat or Use of Nuclear Weapons Case*, opined that “[t]he existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment.” *Legality of the Threat or Use of Nuclear Weapons Case*, Advisory Opinion, [1996] ICJ Rep 226 at 241–42. See also “Report of the Commission to the General Assembly on the work of its fifty-third session” (UN Doc A/56/10) in *Yearbook of the International Law Commission 2001*, vol 2, part 2 (New York: UN, 2007) at 148 (UNDOC. A/CN.4/SER.A/2001/Add.1 (Part 2)); *Award in the Arbitration regarding the Iron Rhine Railway (Belgium v Netherlands)* (2005), ICGJ 373 at para 222 (Permanent Court of Arbitration). Birnie, Boyle & Redgwell argue that principle 21 of *Stockholm Declaration* “already forms the basis for the 1979 Convention on Long-range Transboundary Air Pollution,” the *Vienna Convention*, and the *UNFCCC*. Birnie, Boyle & Redgwell, *supra* note 5 at 339.

<sup>29</sup> *UNFCCC*, *supra* note 1, Preamble.

<sup>30</sup> *Ibid*.

<sup>31</sup> *Ibid*, art 2.

to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.”<sup>32</sup> However, the *UNFCCC* “does not specify what that level might be, nor does Article 2 envisage that it should be achieved immediately”.<sup>33</sup> It is apparent from the objective that the Parties envisage that some degree of climate change is inevitable.<sup>34</sup>

To achieve the objective of the Convention, the following five principles shall guide the Parties:

1. Protecting climate system for the benefit of both present and future generations on the basis of equity and according to their common but differentiated responsibilities and respective capacities in which respect the developed State Parties should take the lead;
2. Considering in full the specific needs and special circumstances of developing State Parties and of those Parties that would have to bear a disproportionate or abnormal burden under the *UNFCCC*;
3. Taking precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. In this respect, efforts to address climate change may be carried out cooperatively by interested Parties;
4. Promoting sustainable development; and
5. Cooperation to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing State Parties. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.<sup>35</sup>

---

<sup>32</sup> *Ibid.*

<sup>33</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 358.

<sup>34</sup> See *ibid.*

<sup>35</sup> *UNFCCC*, *supra* note 1, art 3. According to Birnie, Boyle & Redgwell, these principles “reflect the contours of global environmental responsibility elaborated in the Rio Declaration and Agenda 21.” They assert that “Article 3 takes a novel approach to environmental protection”. They argue that, “in the context of a dynamic and evolutionary regulatory regime such as” the *UNFCCC*, Article 3 possesses “the important merit of providing some predictability regarding the parameters within which the parties are required to work towards the objective of the Convention.” Specifically, the Parties are not “faced with a completely blank sheet of paper when entering subsequent protocol negotiations or when the Conference of the Parties takes decisions under the various articles empowering it to do so.” Birnie, Boyle & Redgwell, *supra* note 5 at 358–59 [footnote omitted].

All 196 Parties to the *UNFCCC*,<sup>36</sup> whether developed or developing States,<sup>37</sup> are committed to:

- Develop, periodically update, publish, and make available to the Conference of the Parties [COP]<sup>38</sup> national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the *Montreal Protocol*,<sup>39</sup> using comparable methodologies to be agreed upon by the COP;<sup>40</sup>

- Formulate, implement, publish, and regularly update national and, where appropriate, regional programs containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change;<sup>41</sup>

- Take climate change considerations into account, to the extent feasible, in their relevant social, economic, and environmental policies and actions, and employ appropriate methods with a view to minimizing adverse effects on the economy, public health, and the quality of the environment;<sup>42</sup>

- Promote sustainable management;<sup>43</sup>

- Cooperate in preparing for adaptation to the impacts of climate change, develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas affected by drought and desertification, as well as floods;<sup>44</sup>

- Promote and cooperate:

- in the development, application and diffusion of technologies, practices, and

---

<sup>36</sup> Currently, there are 196 Parties (195 States and 1 regional economic integration organization) to the *UNFCCC*.

See *UNFCCC*, “Status of Ratification of the Convention”, online: *UNFCCC*

[unfccc.int/essential\\_background/convention/status\\_of\\_ratification/items/2631.php](http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php) (visited July 30, 2015)

[*UNFCCC*, “Status: Convention”].

<sup>37</sup> The *UNFCCC* has divided States mainly into two groups: Annex I developed States and non-Annex I developing States. There is another group of developed States, namely Annex II developed States. All Annex I developed States except States with economies in transition are members of Annex II developed States. Since, under the Convention, special consideration has been accorded to least developed countries [LDCs] of non-Annex I developing States, LDCs can be classified as another group of developing States. 49 States are classified as LDCs by the UN. See *UNFCCC*, “Parties & Observers”, online: *UNFCCC* [unfccc.int/parties\\_and\\_observers/items/2704.php](http://unfccc.int/parties_and_observers/items/2704.php) [UNFCCC, “Parties”].

<sup>38</sup> The Conference of the Parties (COP) is the supreme body of *UNFCCC*. See *UNFCCC*, *supra* note 1, art 7.

<sup>39</sup> *Montreal Protocol*, *supra* note 27.

<sup>40</sup> *UNFCCC*, *supra* note 1, art 4(1)(a).

<sup>41</sup> *Ibid*, art 4(1)(b).

<sup>42</sup> *Ibid*, art 4(1)(f).

<sup>43</sup> *Ibid*, art 4(1)(d).

<sup>44</sup> *Ibid*, art 4(1)(e).

processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>45</sup> in all relevant sectors, including the transport;<sup>46</sup>

- in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the *Montreal Protocol*;<sup>47</sup>

- in scientific, technological, technical, socio-economic and other research, systematic observation, and development of data archives related to the climate system and intended to further the understanding, and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change, and the economic and social consequences of various response strategies;<sup>48</sup>

- in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies;<sup>49</sup> and

- in education, training and public awareness related to climate change, and encourage the widest participation in this process;<sup>50</sup>

---

<sup>45</sup> *Montreal Protocol*, *supra* note 27.

<sup>46</sup> *UNFCCC*, *supra* note 1, art 4(1)(c).

<sup>47</sup> *Ibid*, art 4(1)(d).

<sup>48</sup> *Ibid*, art 4(1)(g). According to *UNFCCC*, *ibid*, art 5, in carrying out this commitment, the Parties shall:

(a) Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort;

(b) Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond national jurisdiction; and

(c) Take into account the particular concerns and needs of developing countries and cooperate in improving their endogenous capacities and capabilities to participate in the efforts referred to in subparagraphs (a) and (b) above.

<sup>49</sup> *Ibid*, art 4(1)(h).

<sup>50</sup> *Ibid*, art 4(1)(i). According to *UNFCCC*, *ibid*, art 6, in carrying out this commitment, the Parties shall:

(a) Promote and facilitate at the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities:

(i) the development and implementation of educational and public awareness programmes on climate change and its effects;

(ii) public access to information on climate change and its effects;

(iii) public participation in addressing climate change and its effects and developing adequate responses; and

(iv) training of scientific, technical and managerial personnel;

(b) Cooperate in and promote, at the international level, and, where appropriate, using existing bodies:

(i) the development and exchange of educational and public awareness material on climate change and its effects; and

- Communicate to the COP information related to implementation, in accordance with Article 12.<sup>51</sup>

The developed State Parties and other Parties included in Annex I<sup>52</sup> are committed to, among other things, perform the following:

- ◆ Adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs. These Parties may implement such policies and measures jointly with other Parties, and may assist other Parties in contributing to the achievement of the objective of the Convention;<sup>53</sup>

- ◆ To this end, communicate, within six months of the entry into force of the Convention and periodically thereafter, and in accordance with Article 12, detailed information on its policies and measures, as well as on its resulting projected anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the *Montreal Protocol*,<sup>54</sup> with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases not controlled by the same Protocol.<sup>55</sup> This information will be reviewed by the COP, at its 1<sup>st</sup> Session and periodically thereafter, in accordance with Article 7.<sup>56</sup> The COP must, at its 1<sup>st</sup> Session, review the adequacy of the above commitments that shall be carried out in the light of the best available scientific information and assessment on climate change and its impacts, as well as relevant technical, social, and economic information. Based on this review, the COP is required to take appropriate action;<sup>57</sup> and

- ◆ Coordinate as appropriate with other such Parties, relevant economic and administrative

---

(ii) the development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.

<sup>51</sup> *Ibid*, art 4(1)(j).

<sup>52</sup> Annex I Parties include the industrialized States which were members of the Organisation for Economic Co-operation and Development in 1992, plus States with economies in transition that include the Russian Federation, the Baltic States, and several Central and Eastern European States. See UNFCCC, “Parties”, *supra* note 37.

<sup>53</sup> UNFCCC, *supra* note 1, art 4(2)(a).

<sup>54</sup> *Montreal Protocol*, *supra* note 27.

<sup>55</sup> With respect to this timescale, Birnie, Boyle & Redgwell, *supra* note 5 at 360 [footnote omitted], argue that, “[a]lthough the timescale envisaged here is more precise than in Article 2, the wording...creates neither a strong nor clear commitment”. However, “this shortcoming is balanced somewhat by the provision for early review of their adequacy by” the COP at its first meeting, and at regular intervals thereafter. In fact, the UNFCCC Parties recognized that, as in the case of the ozone depletion regime, “it would be necessary to strengthen commitments in the light of new scientific information and further assessments of the problem.”

<sup>56</sup> UNFCCC, *supra* note 1, art 4(2)(b).

<sup>57</sup> *Ibid*, art 4(2)(d).



instruments developed to achieve the objective of the *UNFCCC*, and identify and periodically review its own policies and practices which encourage activities that lead to greater levels of anthropogenic emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>58</sup> than would otherwise occur.<sup>59</sup>

The developed State Parties and other developed Parties included in Annex II are required to:<sup>60</sup>

- provide new and additional financial resources to meet the agreed full costs incurred by developing State Parties in complying with their obligations under Article 12, paragraph 1;<sup>61</sup>

- provide such financial resources, including for the transfer of technology, needed by the developing State Parties to meet the agreed full incremental costs of implementing measures that are covered by Article 4, paragraph 1, and that are agreed between a developing State Party and the international entity or entities referred to in Article 11, in accordance with that article;<sup>62</sup>

- assist the developing State Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those effects;<sup>63</sup> and

- take all practicable steps to promote, facilitate, and finance, as appropriate, the transfer of, or access to, environmentally-sound technologies and know-how to other Parties, particularly developing State Parties, to enable them to implement the provisions of the Convention.<sup>64</sup>

It can be observed that these commitments reflect the principle of common but differentiated responsibilities.<sup>65</sup> In fact, “[t]he Convention regime, at Article 4, follows the approach favoured in decades of environmental law treaties of prevention, notably in terms of mitigation and adaptation obligations.”<sup>66</sup> Notwithstanding the obligations of the Parties contained in Article 4 of the *UNFCCC*,<sup>67</sup> it was not until the negotiation of the *Kyoto Protocol* that developed State Parties committed themselves “to explicit, unambiguous targets and timetables for the reduction of the chief greenhouse gases and to the development of international mechanisms for

---

<sup>58</sup> *Montreal Protocol*, *supra* note 27.

<sup>59</sup> *UNFCCC*, *supra* note 1, art 4(2)(e).

<sup>60</sup> Annex II Parties consist of the Organisation for Economic Co-operation and Development members of Annex I, but not the economic in transition Parties. See *UNFCCC*, “Parties”, *supra* note 37.

<sup>61</sup> *UNFCCC*, *supra* note 1, art 4(3).

<sup>62</sup> *Ibid.*

<sup>63</sup> *Ibid.*, art 4(4).

<sup>64</sup> *Ibid.*, art 4(5).

<sup>65</sup> See Birnie, Boyle & Redgwell, *supra* note 5 at 359.

<sup>66</sup> Ong, *supra* note 28 at 454.

<sup>67</sup> See *UNFCCC*, *supra* note 1, art 4.

ensuring the [fulfillment] of these commitments.”<sup>68</sup> It has been emphasized that the extent to which developing State Parties will effectively implement their commitments under the *UNFCCC* will depend on the effective implementation of their commitments under the Convention related to financial resources and transfer of technology. In this respect, the developed State Parties will take fully into account that economic and social development, and poverty eradication are the first and overriding priorities of the developing State Parties.<sup>69</sup>

The *UNFCCC* contains a pecuniary mechanism for the provision of financial resources on a grant or concessional basis. Article 11 defines the financial mechanism that shall function under the guidance of, and be accountable to, the COP, which shall decide the policies, program priorities, and eligibility criteria of the mechanism.<sup>70</sup> The operation of the mechanism shall be entrusted to one or more existing international entities.<sup>71</sup> The mechanism must have “an equitable and balanced representation of all Parties within a transparent system of governance.”<sup>72</sup>

The Convention has established the COP under Article 7 as the supreme body of the *UNFCCC* with the obligation to keep under regular review the implementation of the Convention and any related legal instruments, which it may adopt, and to make necessary decisions to promote effective implementation.<sup>73</sup> The *UNFCCC* has also established a Secretariat,<sup>74</sup> a Subsidiary Body for Scientific and Technological Advice,<sup>75</sup> and a Subsidiary Body for Implementation.<sup>76</sup> A communication requirement is established under Article 12 which requires the Parties to communicate within a time frame to the COP, through the Secretariat, information related to, *inter alia*, their commitments made under Article 4.<sup>77</sup> A Party is free to make such information public or designate it as confidential.<sup>78</sup> Information designated as confidential by the Party shall be aggregated by the Secretariat to protect its confidentiality before being made available to any of

---

<sup>68</sup> Redgwell, “International”, *supra* note 5 at 704.

<sup>69</sup> See *UNFCCC*, *supra* note 1, art 4(7).

<sup>70</sup> See *ibid*, art 11(1).

<sup>71</sup> See *ibid*.

<sup>72</sup> *Ibid*, art 11(2).

<sup>73</sup> See *ibid*, art 7.

<sup>74</sup> See *ibid*, art 8.

<sup>75</sup> This Body will provide the COP and its other subsidiary bodies with timely information and advice on scientific and technological matters relating to the Convention. See *ibid*, art 9.

<sup>76</sup> This Body will assist the COP in the assessment and review of the effective implementation of the Convention. See *ibid*, art 10.

<sup>77</sup> See *ibid*, art 12.

<sup>78</sup> See *ibid*, art 12(9), (10).

the bodies involved in the process.<sup>79</sup> Nevertheless, the information will be made publicly available at the time they are submitted to the COP.<sup>80</sup> The Convention provides for a multilateral consultative process for the resolution of questions regarding the implementation of the same.<sup>81</sup>

The *UNFCCC* contains a dispute settlement procedure.<sup>82</sup> Furthermore, there are provisions regarding the adoption of Annexes to the Convention, and concerning amendment to the Convention and to its Annexes.<sup>83</sup> It is worth noting that the Annexes form an integral part of the Convention.<sup>84</sup> The *UNFCCC* provisions are mandatory since reservations cannot be made to the Convention.<sup>85</sup> Article 17, which facilitates the adoption of protocols to the *UNFCCC*,<sup>86</sup> has paved the way for the adoption of the *Kyoto Protocol* adopted at the 3<sup>rd</sup> Session of the COP (COP 3).<sup>87</sup>

The *UNFCCC* has been widely ratified, although the Convention, it is argued, was and remains controversial.<sup>88</sup> At present, there are 196 Parties to the *UNFCCC*: 194 States and 1 regional economic integration organization.<sup>89</sup> Although the *UNFCCC* disappointed some due to the fact that no quantitative commitments to limit greenhouse gas emissions were established,<sup>90</sup> the Convention established, Rowlands argues, a structure for international consideration of the issue.<sup>91</sup> Ong admires the Convention by regarding it as the most forward looking and far reaching among the agreed treaties.<sup>92</sup>

## **B. Kyoto Protocol**

The objective and principles of the *Kyoto Protocol* are the ultimate objective and the five principles of the *UNFCCC*, respectively.<sup>93</sup> In achieving its quantified emission limitation and

---

<sup>79</sup> See *ibid*, art 12(9).

<sup>80</sup> See *ibid*, art 12(10).

<sup>81</sup> See *ibid*, art 13.

<sup>82</sup> See *ibid*, art 14.

<sup>83</sup> See *ibid*, arts 15, 16.

<sup>84</sup> See *ibid*, art 16(1).

<sup>85</sup> See *ibid*, art 24.

<sup>86</sup> See *ibid*, art 17.

<sup>87</sup> *Kyoto Protocol*, *supra* note 21. See also Ong, *supra* note 28 at 456.

<sup>88</sup> See Birnie, Boyle & Redgwell, *supra* note 5 at 52.

<sup>89</sup> See UNFCCC, “Status: Convention”, *supra* note 36.

<sup>90</sup> See generally International Law Commission, *First Report on the Protection of the Atmosphere*, UNGAOR, 2014, UN Doc A/CN.4/667 at 26 [ILC, *First Report*].

<sup>91</sup> See Rowlands, *supra* note 5 at 328.

<sup>92</sup> See Ong, *supra* note 28 (the *UNFCCC* “is perhaps the most forward looking (in terms of its global environmental objectives) and far reaching (in terms of its implications for human economic activity) yet agreed” at 455).

<sup>93</sup> See *Kyoto Protocol*, *supra* note 21, Preamble.

reduction commitments under Article 3,<sup>94</sup> and in order to promote sustainable development, the Protocol requires the Annex I developed States to:

- implement and/or further elaborate policies and measures in accordance with its national circumstances, such as, *inter alia*, measures to limit and/or reduce emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>95</sup> in the transport sector; and
- cooperate with other such Parties to enhance the individual and combined effectiveness of their policies and measures adopted under Article 2, according to Article 4(2)(e)(i) of the *UNFCCC*.<sup>96</sup>

Article 3 of the *Kyoto Protocol* requires the Annex I Parties to ensure, individually or jointly,<sup>97</sup> that their aggregate anthropogenic carbon dioxide equivalent (CO<sub>2</sub>e) emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts,<sup>98</sup> calculated according to their quantified emission limitation and reduction commitments inscribed in Annex B,<sup>99</sup> “with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the [first] commitment period 2008 to 2012.”<sup>100</sup> Moreover, Annex I developed State Parties are required, by 2005, to “have made demonstrable progress in achieving its commitments under this Protocol.”<sup>101</sup> Interestingly, the *Kyoto Protocol* became effective in 2005.

Birnie, Boyle and Redgwell consider that the key feature of the *Kyoto Protocol* is its establishment of quantitative restrictions on emissions from industrialized economies.<sup>102</sup> Additionally, the authors argue that, “[w]hilst reductions of 5% or so may seem low, they are deceptive. Choice of 1990 as the main base year means that percentage reductions of up to 30% or

---

<sup>94</sup> *Ibid*, art 3.

<sup>95</sup> *Montreal Protocol*, *supra* note 27.

<sup>96</sup> *Kyoto Protocol*, *supra* note 21, art 2. See *UNFCCC*, *supra* note 1, art 4(2)(e)(i).

<sup>97</sup> Joint activities must comply with the procedure set out in Article 4. See *Kyoto Protocol*, *supra* note 21, art 4.

<sup>98</sup> Annex A lists the following greenhouse gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). *Ibid*, Annex A. At the 18<sup>th</sup> Session of the UNFCCC COP held in Doha in 2012, this list has been amended applicable from the beginning of the second commitment period. According to the amendment to the *Kyoto Protocol*, a new greenhouse gas, namely, nitrogen trifluoride (NF<sub>3</sub>), has been included in the list. See *Doha amendment to the Kyoto Protocol*, 8 December 2012, C.N.718.2012.TREATIES-XXVII.7.c, art 1(B), online: UN <[treaties.un.org/doc/Publication/CN/2012/CN.718.2012-Eng.pdf](http://treaties.un.org/doc/Publication/CN/2012/CN.718.2012-Eng.pdf)> [*Doha amendment*].

<sup>99</sup> See *Kyoto Protocol*, *supra* note 21, Annex B. At the 18<sup>th</sup> Session of the UNFCCC COP held in Doha in 2012, Annex B has been amended. See *Doha amendment*, *supra* note 98, art 1(A).

<sup>100</sup> *Kyoto Protocol*, *supra* note 21, art 3(1).

<sup>101</sup> *Ibid*, art 3(2).

<sup>102</sup> See Birnie, Boyle & Redgwell, *supra* note 5 at 360–61.

more of *present* emissions will have to be made by those [States] whose greenhouse gas emissions have increased since 1990.”<sup>103</sup>

The *Kyoto Protocol* requires the Annex I Parties to strive to implement policies and measures under Article 2 in such a way as “to minimize adverse effects, including the adverse effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties,” particularly developing State Parties.<sup>104</sup> The Protocol also contains provision for taking decision regarding second and subsequent commitment periods, i.e. beyond 2012.<sup>105</sup> The *Kyoto Protocol* is subject to periodical review by the COP in the light of the best available scientific information and assessments on climate change and its impacts, as well as relevant technical, social, and economic information.<sup>106</sup> The implementation of this protocol has to be reviewed regularly, and decisions necessary to promote effective implementation must be made by the COP.<sup>107</sup> The UNFCCC COP serves as the meeting of the Parties to the *Kyoto Protocol* [CMP].<sup>108</sup>

As noted earlier, the transportation sector is identified as one where measures related to emissions reductions can be implemented.<sup>109</sup> Article 2, paragraph 2 of the *Kyoto Protocol* provides that the Annex I Parties shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>110</sup> from aviation and marine bunker fuels, and this should be done by working through the International Civil Aviation Organization [ICAO] and the International Maritime Organization, respectively.<sup>111</sup> Thus, ICAO has been provided with “a clear mandate...to be the authoritative body” in international civil aviation to deal with climate change issues, which the Organization welcomed.<sup>112</sup>

The dispute settlement procedure of the *UNFCCC* shall apply *mutatis mutandis*, i.e. with necessary changes, to the *Kyoto Protocol*.<sup>113</sup> Like the *UNFCCC*, Annexes form an integral part of

---

<sup>103</sup> *Ibid* at 361 [emphasis in original].

<sup>104</sup> *Kyoto Protocol*, *supra* note 21, art 2(3). Again, *Kyoto Protocol*, *ibid*, art 3(14), requires the Annex I Party to implement the commitments mentioned in Article 3, paragraph 1, in such a way as “to minimize adverse social, environmental and economic impacts on developing country Parties”.

<sup>105</sup> See *ibid*, art 3(4), (9).

<sup>106</sup> See *ibid*, art 9(1).

<sup>107</sup> See *ibid*, art 13(4).

<sup>108</sup> See *ibid*, art 13(1).

<sup>109</sup> See *ibid*, art 2(1)(a)(vii).

<sup>110</sup> *Montreal Protocol*, *supra* note 27.

<sup>111</sup> See *Kyoto Protocol*, *supra* note 21, art 2(2).

<sup>112</sup> Dempsey, *supra* note 15 at 450.

<sup>113</sup> See *Kyoto Protocol*, *supra* note 21, art 19.

the *Kyoto Protocol*,<sup>114</sup> and the Protocol provisions are mandatory since no reservations can be made thereto.<sup>115</sup> Like the *UNFCCC*, there are provisions regarding amendments to this protocol and to the Annexes thereto.<sup>116</sup>

All Parties to the *Kyoto Protocol* are required to discharge certain obligations “taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances”.<sup>117</sup> However, no new commitment for non-Annex I Parties can be introduced to discharge these obligations. They have to be discharged through “reaffirming existing commitments” under Article 4(1) of the *UNFCCC*, and continuing to advance their implementation “to achieve sustainable development”, while taking into consideration Article 4, paragraphs 3, 5 and 7 of the *UNFCCC*.<sup>118</sup>

---

<sup>114</sup> See *ibid*, art 21(1).

<sup>115</sup> See *ibid*, art 26.

<sup>116</sup> See *ibid*, arts 20, 21.

<sup>117</sup> *Ibid*, art 10.

<sup>118</sup> *Kyoto Protocol, ibid*, art 10, provides:

All Parties...shall:

(a) Formulate, where relevant and to the extent possible, cost-effective national and, where appropriate, regional programmes to improve the quality of local emission factors, activity data and/or models which reflect the socio-economic conditions of each Party for the preparation and periodic updating of national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol...;

(b) Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change:

(i) Such programmes would, *inter alia*, concern the energy, transport and industry sectors as well as agriculture, forestry and waste management. Furthermore, adaptation technologies and methods for improving spatial planning would improve adaptation to climate change; and

(ii) Parties included in Annex I shall submit information on action under this Protocol, including national programmes, in accordance with Article 7; and other Parties shall seek to include in their national communications, as appropriate, information on programmes which contain measures that the Party believes contribute to addressing climate change and its adverse impacts, including the abatement of increases in greenhouse gas emissions, and enhancement of and removals by sinks, capacity building and adaptation measures;

(c) Cooperate in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies, know-how, practices and processes pertinent to climate change, in particular to developing countries, including the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain and the creation of an enabling environment for the private sector, to promote and enhance the transfer of, and access to, environmentally sound technologies;

(d) Cooperate in scientific and technical research and promote the maintenance and the development of systematic observation systems and development of data archives to reduce uncertainties related to the climate system, the adverse impacts of climate change and the economic and social consequences of various response strategies, and promote the development and strengthening of endogenous capacities and capabilities to participate in international and intergovernmental efforts, programmes and networks on research and systematic observation, taking into account Article 5 of the [UNFCCC];

While States must meet their targets primarily through national measures under the *UNFCCC*, the *Kyoto Protocol* “offers them an additional means of meeting their targets by way of three market-based mechanisms”,<sup>119</sup> namely, the joint implementation [JI],<sup>120</sup> the clean development mechanism [CDM],<sup>121</sup> and emissions trading.<sup>122</sup> These mechanisms are often referred to as flexibility mechanisms.<sup>123</sup> Some authors regard these mechanisms as innovative feature of the Protocol.<sup>124</sup> Rowlands considers that these mechanisms “represent a noteworthy development in international environmental law”.<sup>125</sup>

---

(e) Cooperate in and promote at the international level, and, where appropriate, using existing bodies, the development and implementation of education and training programmes, including the strengthening of national capacity building, in particular human and institutional capacities and the exchange or secondment of personnel to train experts in this field, in particular for developing countries, and facilitate at the national level public awareness of, and public access to information on, climate change...;

(f) Include in their national communications information on programmes and activities undertaken pursuant to this Article in accordance with relevant decisions of the [COP]; and

(g) Give full consideration, in implementing the commitments under this Article, to Article 4, paragraph 8, of the [UNFCCC].

<sup>119</sup> UNFCCC, “Kyoto Protocol”, online: UNFCCC <unfccc.int/kyoto\_protocol/items/2830.php>. It should be noted that market-based measures were “first used as environmental tools in the [United States] in the 1990s in the form of Title IV of the Clean Air (Amendment) Act 1990.” Birnie, Boyle & Redgwell, *supra* note 5 at 364.

<sup>120</sup> Joint implementation is a project-based mechanism that allows a State “with an emission reduction or limitation commitment under the Kyoto Protocol (Annex B Party) to earn emission reduction units (ERUs) from an emission-reduction or emission removal project in another Annex B Party, each equivalent to one tonne of CO<sub>2</sub>, which can be counted towards meeting its Kyoto target.” UNFCCC, “Joint Implementation (JI)”, online: UNFCCC <unfccc.int/kyoto\_protocol/mechanisms/joint\_implementation/items/1674.php>. See also ICAO Secretariat, “Economic Instruments: Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 128 at 128 [ICAO Secretariat, “Economic”].

<sup>121</sup> Clean Development Mechanism [CDM], a project-based mechanism, allows a State “with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing [States]. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO<sub>2</sub>, which can be counted towards meeting Kyoto targets.” UNFCCC, “Clean Development Mechanism (CDM)”, online: UNFCCC

<unfccc.int/kyoto\_protocol/mechanisms/clean\_development\_mechanism/items/2718.php>. CDM projects include afforestation and reforestation projects in developing States. See ICAO Secretariat, “Economic”, *supra* note 120 at 128.

<sup>122</sup> Emissions trading, a market-based mechanism, allows States “that have emission units to spare - emissions permitted them but not “used” - to sell this excess capacity to [States] that are over their targets.” UNFCCC, “International Emissions Trading”, online: UNFCCC <unfccc.int/kyoto\_protocol/mechanisms/emissions\_trading/items/2731.php>. See also ICAO Secretariat, “Economic”, *supra* note 120 at 128.

<sup>123</sup> See Rowlands, *supra* note 5 at 330ff; Birnie, Boyle & Redgwell, *supra* note 5 at 361ff; Ong, *supra* note 28 at 456.

<sup>124</sup> See Rowlands, *supra* note 5 (“Ellen Hey calls these flexibility mechanisms, from a legal and institutional perspective, ‘the most noteworthy and complicating innovation introduced by the Kyoto Protocol.’ Philippe Sands, meanwhile, labels them ‘by far the most innovative ... aspect of the Kyoto Protocol negotiations.’” at 330 [footnotes omitted]); Birnie, Boyle & Redgwell, *supra* note 5 (“[t]he Kyoto Protocol’s use of market-based instruments to generate emission reductions is commonly described as innovative or radical” at 363 [footnote omitted]).

<sup>125</sup> Rowlands, *supra* note 5 at 332. Rowlands, *ibid* at 332, asserts that “[t]he introduction of market-based instruments to meet an environmental goal is significant for it represents further commodification of the

Article 6, paragraph 1 of the *Kyoto Protocol* provides for joint implementation:

For the purpose of meeting its commitments under Article 3, any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy, provided that:

- (a) Any such project has the approval of the Parties involved;
- (b) Any such project provides a reduction in emissions by sources, or an enhancement of removals by sinks, that is additional to any that would otherwise occur;
- (c) It does not acquire any emission reduction units if it is not in compliance with its obligations under Articles 5 and 7; and
- (d) The acquisition of emission reduction units shall be *supplemental* to domestic actions for the purposes of meeting commitments under Article 3.<sup>126</sup>

Article 12 defines clean development mechanism the purpose of which has to be assisting non-Annex I developing State Parties “in achieving sustainable development and in contributing to the ultimate objective of” the *UNFCCC*, and assisting Annex I Parties “in achieving compliance with their quantified emission limitation and reduction commitments under Article 3” of the *Kyoto Protocol*.<sup>127</sup> This is the only market-based mechanism that engages developing State Parties.<sup>128</sup>

Article 12, paragraph 3 of the *Kyoto Protocol* provides:

Under the clean development mechanism:

- (a) Parties not included in Annex I will benefit from project activities resulting in certified emission reductions; and
- (b) Parties included in Annex I may use the certified emission reductions accruing from such project activities to contribute to compliance with part of their quantified emission limitation and reduction commitments under Article 3, as determined by the Conference of the Parties serving as the meeting of the Parties to this Protocol.<sup>129</sup>

---

international environment. Moreover, with the potential for large sums of money to be exchanged in markets, it brings in domestic players to a much greater extent.”

<sup>126</sup> *Kyoto Protocol*, *supra* note 21, art 6(1) [emphasis added]. The inclusion of this provision for the establishment of an economic mechanism for the trading of emission reduction units is considered by one author as very important. See Ong, *supra* note 28 at 456. *Kyoto Protocol*, *ibid*, art 5(1), requires Annex I Parties to have “in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol.” According to *Kyoto Protocol*, *ibid*, art 7, Annex I Parties are required to “incorporate in its annual inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol...the necessary supplementary information for the purposes of ensuring compliance with Article 3”, and to “incorporate in its national communication, submitted under Article 12 of the [UNFCCC], the supplementary information necessary to demonstrate compliance with its commitments under this Protocol”. Information submitted under Article 7 is subject to expert review. See *Kyoto Protocol*, *ibid*, art 8.

<sup>127</sup> *Kyoto Protocol*, *supra* note 21, art 12 (the mechanism “shall be subject to the authority and guidance of the [CMP] and be supervised by an executive board of the clean development mechanism” art 12(4)).

<sup>128</sup> See Rowlands, *supra* note 5 at 331.

<sup>129</sup> *Kyoto Protocol*, *supra* note 21, art 12(3).



The clean development mechanism must assist in arranging funding of certified project activities as necessary.<sup>130</sup> Emissions reductions resulting from each clean development mechanism project activity has to be certified by operational entities to be designated by the CMP.<sup>131</sup> The certification has to be performed on the basis of the following three criteria:

- Voluntary participation approved by each Party involved;
- Real, measurable, and long-term benefits related to the mitigation of climate change; and
- Reductions in emissions that are additional to any that would occur in the absence of the certified project activity.<sup>132</sup>

The Cancun Agreements,<sup>133</sup> agreed upon during the 16<sup>th</sup> Session of the COP [COP 16], strengthened the clean development mechanism “to drive more major investments and technology into environmentally sound and sustainable emission reduction projects in the developing world.”<sup>134</sup>

Unlike the above two mechanisms, emissions trading is not defined in the *Kyoto Protocol*, leaving the matter to the COP.<sup>135</sup> Article 17 provides that the COP “shall define the relevant principles, modalities, rules and guidelines, in particular for verification, reporting and accountability for emissions trading.”<sup>136</sup> However, it further provides that “[a]ny such trading shall be *supplemental* to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under” Article 3.<sup>137</sup>

---

<sup>130</sup> See *ibid*, art 12(6).

<sup>131</sup> See *ibid*, art 12(5).

<sup>132</sup> See *ibid*.

<sup>133</sup> To access all the agreements, see UNFCCC, “Cancun Agreements”, online: UNFCCC <[unfccc.int/meetings/cancun\\_nov\\_2010/items/6005.php](http://unfccc.int/meetings/cancun_nov_2010/items/6005.php)>.

<sup>134</sup> UNEP, Press Release, “UN Climate Change Conference in Cancun delivers balanced package of decisions, restores faith in multilateral process” (11 December 2010), online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?DocumentID=653&ArticleID=6866&l=en&WT.rss\\_f=pr&WT.rss\\_a=653-6866](http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=653&ArticleID=6866&l=en&WT.rss_f=pr&WT.rss_a=653-6866)>.

<sup>135</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 364 [footnote omitted], explain the rationale of the emissions trading in the following words:

A regulator sets a cap on aggregate emissions, distributes the right to emit to regulated facilities (with their emission allowances totalling less than the aggregate emissions), and permits the market to determine the emission price and degree of abatement at individual facilities. If the regulator allows regulated facilities to transfer their emission allowances, the distribution of emission reductions among facilities will be equal to the marginal cost of emission reductions among facilities. If the marginal cost of emission reductions varies among facilities, total costs can be lowered by reallocating greater effort to the facility that can lower emissions at a lower cost. Thus, when marginal cost is equal among facilities, total costs are lowest and the environmental target is reached.

<sup>136</sup> *Kyoto Protocol*, *supra* note 21, art 17.

<sup>137</sup> *Ibid* [emphasis added].

It is worth noting that all these market-based mechanisms are supplemental to and, not a replacement of, the national measures to reach the emissions target under the Protocol. Ong asserts that the main policy and legal prescriptions adopted by the *UNFCCC* and confirmed by the *Kyoto Protocol* “were arguably primarily based upon the reduction of emissions through traditional ‘command and control’-type regulations, with economic-based instruments... initially conceived mainly as a secondary tool in the fight against global warming.”<sup>138</sup> The ability of these mechanisms to cost-effectively mitigate climate change and global warming motivated States to include these flexibility mechanisms. It has been contended that “these kinds of flexibility mechanism would not only be cost-effective (a principle recognized in Article 3 of the UNFCCC), but they would also increase the chances of widespread participation in the [climate change] regime.”<sup>139</sup>

Article 18 of the Protocol provides for the adoption of appropriate and effective non-compliance procedures and mechanisms by the CMP.<sup>140</sup> Non-compliance procedures and mechanisms entailing binding consequences shall be adopted by means of an amendment to this protocol.<sup>141</sup> A compliance mechanism, designed to strengthen the Protocol’s environmental integrity, support the carbon market’s credibility, and ensure transparency of accounting by Parties,<sup>142</sup> has already been adopted.<sup>143</sup> The objective of such mechanism is “to facilitate, promote

---

<sup>138</sup> Ong, *supra* note 28 at 457.

<sup>139</sup> Rowlands, *supra* note 5 at 331. Ong, *supra* note 28 at 456, states:

Joint Implementation allows Annex I Parties only to trade among themselves emission reduction units (ERUs) obtained by implementing cooperative projects reducing their emissions or establishing greenhouse gas sinks. As it is cheaper at the margin for some countries to abate their greenhouse gases compared to other countries, such joint implementation projects are in theory at least a cost-effective mechanism for achieving global targets. An early estimate of the global cost of achieving the Kyoto Protocol targets was US\$120 billion if each country satisfies its obligations entirely through domestic actions, but this cost drops to just US\$11-54 billion if emissions trading and certified emissions reductions (CERs) under the Clean Development Mechanism (CDM) are allowed.

<sup>140</sup> *Kyoto Protocol*, *supra* note 21, art 18, provides:

The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol, including through the development of an indicative list of consequences, taking into account the cause, type, degree and frequency of non-compliance. Any procedures and mechanisms under this Article entailing binding consequences shall be adopted by means of an amendment to this Protocol.

<sup>141</sup> See *ibid.*

<sup>142</sup> See UNFCCC, “Introduction: An Introduction to the Kyoto Protocol Compliance Mechanism”, online: UNFCCC <[unfccc.int/kyoto\\_protocol/compliance/items/3024.php](http://unfccc.int/kyoto_protocol/compliance/items/3024.php)> [UNFCCC, “Introduction: Compliance”].

<sup>143</sup> See *Decision 27/CMP.1: Procedures and mechanisms relating to compliance under the Kyoto Protocol*, UNFCCC CMPOR, 1st Sess, Doc FCCC/KP/CMP/2005/8/Add.3 (2006) 92, online: UNFCCC <[unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf](http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf)>.

and enforce compliance”<sup>144</sup> with the commitments under the *Kyoto Protocol*.<sup>145</sup> It has been claimed that “[i]t is among the most comprehensive and rigorous systems of compliance for a multilateral environmental agreement.”<sup>146</sup> It is argued that “[i]t is the last of these objectives – enforcement – which gives [the Protocol] a distinctive character unique among environmental treaties.”<sup>147</sup> Undoubtedly, a strong and effective compliance mechanism is key to the success of the implementation of the *Kyoto Protocol*.<sup>148</sup> It can be submitted that the Protocol is a substantial advancement of the *UNFCCC*, “which it strengthens by providing means for remedial and precautionary action to address climate change.”<sup>149</sup>

At the 18<sup>th</sup> Session of the COP [COP 18], States made good use of the *Kyoto Protocol*’s provision for taking decision regarding the second and subsequent commitment periods.<sup>150</sup> States successfully launched the second commitment period from 1 January 2013 to 31 December 2020, agreed to a firm timetable to adopt a universal climate agreement by 2015, and agreed to a path to raise the necessary ambition to respond to climate change.<sup>151</sup> Additionally, the *Kyoto Protocol* has been amended so that it will continue as of 1 January 2013.<sup>152</sup> Those amendments have not become effective at the time of this writing.<sup>153</sup> Amendments of relevance to this thesis are: a new list of greenhouse gases will replace the current list in Annex A to the Protocol,<sup>154</sup> and Annex I Parties shall have a new obligation to ensure, individually or jointly, that their aggregate anthropogenic CO<sub>2</sub> equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts with a view to reducing their overall emissions of greenhouse gases by at least 18 percent

---

<sup>144</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 249.

<sup>145</sup> See UNFCCC, “Introduction: Compliance”, *supra* note 142.

<sup>146</sup> *Ibid.*

<sup>147</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 249.

<sup>148</sup> See UNFCCC, “Introduction: Compliance”, *supra* note 142.

<sup>149</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 362.

<sup>150</sup> See *Kyoto Protocol*, *supra* note 21, art 3(4), (9).

<sup>151</sup> See UN, Climate Change Secretariat, Press Release, “At UN Climate Change Conference in Doha, governments take next essential step in global response to climate change” (8 December 2012), online: UNFCCC <[unfccc.int/files/press/press\\_releases\\_advisories/application/pdf/pr20120812\\_cop18\\_close.pdf](http://unfccc.int/files/press/press_releases_advisories/application/pdf/pr20120812_cop18_close.pdf)> [“At UN Climate Change Conference”]. See also Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, *Agenda item 4: Report of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol*, UNFCCC CMPOR, 8th Sess, Doc FCCC/KP/CMP/2012/L.9 (2012), online: UNFCCC <[unfccc.int/resource/docs/2012/cmp8/eng/109.pdf](http://unfccc.int/resource/docs/2012/cmp8/eng/109.pdf)>.

<sup>152</sup> See “At UN Climate Change Conference”, *supra* note 151.

<sup>153</sup> For the amendments to become effective, a total of 144 instruments of acceptance are required. However, at the time of this writing, only 41 instruments of acceptance have been submitted. For updated information, see online: UN Treaty Collection <[treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-7-c&chapter=27&lang=en](http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-c&chapter=27&lang=en)> (visited August 20, 2015).

<sup>154</sup> See *Doha amendment*, *supra* note 98, art 1(B).

below 1990 levels in the second commitment period from 2013 to 2020.<sup>155</sup>

There are 192 Parties to the *Kyoto Protocol* (191 States and 1 regional economic integration organization).<sup>156</sup> Unfortunately, the United States [US], one of the largest industrialized Annex I Parties, has not ratified the Protocol, and Canada, another industrialized Annex I Party, has withdrawn from the Protocol.<sup>157</sup> Regarding the *Kyoto Protocol*, Rowlands argues that the “Protocol – as well as the broader climate change regime – represents an important international environmental milestone.”<sup>158</sup> To Ong, the Protocol was successful in at least two respects: by establishing a specific greenhouse gas emissions target to be achieved by nearly every industrialized nation; and by determining how these targets are to be met, though only in general terms.<sup>159</sup>

### **3.2.1.2 Ozone depletion regime**

#### **A. Vienna Convention for the Protection of the Ozone Layer**

Climate change and ozone depletion are to some extent interlinked due to the fact that some ozone depleting substances also contribute to global warming and, consequently, climate change.<sup>160</sup> Again, greenhouse gases controlled by the *Montreal Protocol* remain outside the purview of the *UNFCCC* and the *Kyoto Protocol*. Therefore, better coordination of the ozone depletion regime, i.e. the *Vienna Convention* and *Montreal Protocol*, and the climate change regime, i.e. the *UNFCCC* and *Kyoto Protocol*, is essential to tackle climate change and global warming.<sup>161</sup> Hence, it is necessary to briefly discuss the *Vienna Convention*,<sup>162</sup> and the *Montreal Protocol* to the same Convention.<sup>163</sup>

---

<sup>155</sup> See *ibid*, art 1(C).

<sup>156</sup> See UNFCCC, “Status of Ratification of the Kyoto Protocol”, online: UNFCCC <[unfccc.int/kyoto\\_protocol/status\\_of\\_ratification/items/2613.php](http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php)>.

<sup>157</sup> See *ibid*.

<sup>158</sup> Rowlands, *supra* note 5 at 328.

<sup>159</sup> See Ong, *supra* note 28 at 457.

<sup>160</sup> See Birnie, Boyle & Redgwell, *supra* note 5 at 336.

<sup>161</sup> See also *ibid* at 355; Rowlands, *supra* note 5 (“linkages between these two relatively discrete regimes – that is, ozone layer and climate change – need to be, and fortunately have been, made” at 335).

<sup>162</sup> *Vienna Convention*, *supra* note 26. For detailed discussion and latest version of the agreement, see UNEP, *Handbook for the Vienna Convention for the Protection of the Ozone Layer (1985)*, 9th ed (Nairobi: UNEP Secretariat for the Vienna Convention for the Protection of the Ozone Layer & the Montreal Protocol on Substances that Deplete the Ozone Layer, 2012).

<sup>163</sup> *Montreal Protocol*, *supra* note 27. For detailed discussion and latest version of the agreement, see UNEP, *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer*, 9th ed (Nairobi: UNEP Secretariat for the Vienna Convention for the Protection of the Ozone Layer & the Montreal Protocol on Substances that Deplete the Ozone Layer, 2012) [*Handbook for the Montreal Protocol*].

Like the *UNFCCC*, the Parties to the *Vienna Convention* recalled the *Stockholm Declaration*,<sup>164</sup> specifically Principle 21 thereof that recognizes the sovereign right of States to exploit their own resources within their jurisdiction or control so long as it does not cause damage to the environment of other States or areas beyond the limits of national jurisdiction.<sup>165</sup> The Parties to the *Vienna Convention* took account of the circumstances and particular requirements of developing States, and determined to protect human health and the environment against adverse effects resulting from modifications of the ozone layer.<sup>166</sup> The Convention is “one of the first to perceive the need for preventive action in advance of firm proof of actual harm, and in that sense it is indicative of the emergence of a more ‘precautionary’ approach than had been typical for earlier pollution conventions”.<sup>167</sup> The Convention obliges the Parties to “take appropriate measures in accordance with the provisions of this Convention and of those protocols in force to which they are party to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer.”<sup>168</sup> To this end, the Parties are required, according to the means at their disposal and capabilities, to:

- co-operate by means of systemic observations, research and information exchange;
- adopt appropriate legislative or administrative measures and co-operate in harmonizing appropriate policies to control, limit, reduce or prevent human activities under their jurisdiction or control;
- co-operate in the formulation of agreed measures, procedures and standards for the implementation of the Convention; and
- co-operate with competent international bodies to implement effectively the Convention and Protocols to which they are party.<sup>169</sup>

Nonetheless, the *Vienna Convention* does not define the nature of such measures.<sup>170</sup> In fact,

---

<sup>164</sup> *Stockholm Declaration*, *supra* note 8.

<sup>165</sup> See *Vienna Convention*, *supra* note 26, Preamble.

<sup>166</sup> See *ibid.*

<sup>167</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 351.

<sup>168</sup> *Vienna Convention*, *supra* note 26, art 2(1).

<sup>169</sup> *Ibid*, art 2(2). The following issues are recognized in *Vienna Convention*, *ibid*, Annex I(1), as major scientific issues:

- (a) Modification of the ozone layer which would result in a change in the amount of solar ultra-violet radiation having biological effects (U V-B) that reaches the Earth's surface and the potential consequences for human health, for organisms, ecosystems and materials useful to mankind;
- (b) Modification of the vertical distribution of ozone, which could change the temperature structure of the atmosphere and the potential consequences for weather and climate.

<sup>170</sup> See Birnie, Boyle & Redgwell, *supra* note 5 at 350.

since the Convention does not require the Parties “to take concrete actions to control ozone depleting substances”, it is often referred to as a framework treaty.<sup>171</sup> Like the *UNFCCC*, the *Vienna Convention* “served as a framework for efforts to protect the globe’s ozone layer”.<sup>172</sup>

Under the *Vienna Convention*, the term “adverse effects” is defined as including climate change.<sup>173</sup> Again, the Parties are obliged to co-operate in conducting research and systematic observations, and in formulating recommendations for future research and observation in the area of, *inter alia*, research on effects on climate.<sup>174</sup> The following chemical substances of natural and anthropogenic origin are thought to have the potential to modify the chemical and physical properties of the ozone layer:

- Carbon substances (carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and non-methane hydrocarbon species);
- Nitrogen substances (nitrous oxide (N<sub>2</sub>O), and nitrogen oxides (NO<sub>x</sub>));
- Hydrogen substances (hydrogen (H<sub>2</sub>), and water (H<sub>2</sub>O));
- Chlorine substances; and
- Bromine substances.<sup>175</sup>

It can be seen that the list includes a good number of greenhouse gases that accelerate climate change and global warming. Moreover, some of these gases are emitted by aircraft engines.<sup>176</sup>

The *Vienna Convention* welcomes additional domestic measures unless those are incompatible with the Convention.<sup>177</sup> The Parties are required to transmit information to the Conference of the Parties to this convention, which shall continuously review their implementation of the *Vienna Convention* and of the Protocols to which they are party.<sup>178</sup>

Like the *UNFCCC* and the *Kyoto Protocol*,<sup>179</sup> the Annexes to the *Vienna Convention* or to any Protocol shall form an integral part of the Convention or of such Protocol.<sup>180</sup> Again, the

---

<sup>171</sup> UNEP, Ozone Secretariat, “The Vienna Convention for the Protection of the Ozone Layer”, online: UNEP <[ozone.unep.org/new\\_site/en/vienna\\_convention.php](http://ozone.unep.org/new_site/en/vienna_convention.php)> [UNEP, “Vienna Convention”].

<sup>172</sup> *Ibid.*

<sup>173</sup> *Vienna Convention*, *supra* note 26, art 1(2). See also Birnie, Boyle & Redgwell, *supra* note 5 at 351.

<sup>174</sup> See *Vienna Convention*, *supra* note 26, Annex I(2).

<sup>175</sup> See *ibid.*, Annex I(4).

<sup>176</sup> For more information, see ch 2, *above*.

<sup>177</sup> See *Vienna Convention*, *supra* note 26, art 2(3).

<sup>178</sup> See *ibid.*, arts 5, 6.

<sup>179</sup> See *UNFCCC*, *supra* note 1, arts 16(1), 24; *Kyoto Protocol*, *supra* note 21, arts 21(1), 26.

<sup>180</sup> See *Vienna Convention*, *supra* note 26, art 10(1).

provisions of the Convention are binding since no reservations may be made thereto.<sup>181</sup> The *Vienna Convention* has its own dispute settlement procedure.<sup>182</sup> Article 8 provides for the adoption of protocol to the Convention that gave birth to the *Montreal Protocol*.<sup>183</sup>

In 2009, the *Vienna Convention* “became the first Convention of any kind to achieve universal ratification.”<sup>184</sup> The Convention currently has 197 Parties.<sup>185</sup>

## **B. Montreal Protocol**

The Parties to the *Montreal Protocol* recognized that world-wide emissions of certain substances can significantly deplete and otherwise modify the ozone layer in a manner that is likely to result in adverse effects on human health and the environment.<sup>186</sup> In this regard, they considered the importance of promoting international co-operation in the research, development, and transfer of alternative technologies relating to the control and reduction of emissions of substances that deplete the ozone layer, bearing in mind in particular the needs of developing States,<sup>187</sup> and acknowledged that special provision is required to meet the needs of developing States for these substances.<sup>188</sup> Therefore, the Parties determined to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge, taking into account technical and economic considerations.<sup>189</sup>

Control measures under the Protocol are provided in Article 2,<sup>190</sup> and calculation of control levels in Article 3.<sup>191</sup> The control measures have to be assessed and reviewed by the Parties on the basis of available scientific, environmental, technical, and economic information commencing in 1990, and at least every four years thereafter.<sup>192</sup> Some authors consider this requirement – to assess and review control measures – as the most important innovation of the *Montreal Protocol* and the

---

<sup>181</sup> See *ibid*, art 18.

<sup>182</sup> See *ibid*, art 11.

<sup>183</sup> See *ibid*, art 8. *Montreal Protocol*, *supra* note 27.

<sup>184</sup> UNEP, “Vienna Convention”, *supra* note 171.

<sup>185</sup> To learn more about the status of this convention, see online: UN Treaty Collection <[treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-2&chapter=27&lang=en](http://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-2&chapter=27&lang=en)>.

<sup>186</sup> See *Montreal Protocol*, *supra* note 27, Preamble; *Handbook for the Montreal Protocol*, *supra* note 163 at 3.

<sup>187</sup> Provisions regarding developing States are provided in Article 5. See *Montreal Protocol*, *supra* note 27, art 5.

<sup>188</sup> See *ibid*, Preamble; *Handbook for the Montreal Protocol*, *supra* note 163 at 3–4.

<sup>189</sup> See *ibid*.

<sup>190</sup> See *Montreal Protocol*, *supra* note 27, art 2.

<sup>191</sup> See *ibid*, art 3.

<sup>192</sup> See *ibid*, art 6.

most impressive feature of the ozone depletion regime.<sup>193</sup> Based on that assessment under Article 6, “[c]ombined majorities of industrialized and developing states are empowered [under Article 2, paragraph 9] to amend standards set by the protocol for production and consumption of controlled ozone-depleting substances.”<sup>194</sup> Once adopted, these adjustments automatically become binding on all Parties to the Protocol.<sup>195</sup> Withdrawal from the Protocol then remains the only available option for those States that do not find such an amendment acceptable.<sup>196</sup> It is argued that this precedent of the *Montreal Protocol* is unique among environmental agreements.<sup>197</sup>

The Protocol regulates 95 ozone-depleting substances grouped as chlorofluorocarbons (CFCs), halons, other fully halogenated CFCs, carbon tetrachloride, methyl chloroform, hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), bromochloromethane, and methyl bromide.<sup>198</sup> The Protocol requires a phased reduction of these substances.<sup>199</sup> The Protocol applies to aviation as far as these controlled substances are concerned, though aviation is not specifically mentioned therein.<sup>200</sup>

The Protocol imposes a reporting obligation on the Parties regarding statistical data on their production, imports, and exports of the controlled substances.<sup>201</sup> To ensure more effectiveness of the control measures and to ensure that non-Parties do not benefit from the control measures obligatory on the Parties to the Protocol, a restriction on the export-import of controlled substances is imposed.<sup>202</sup> Later amendment introduces a new export-import licensing system for better implementation of the Protocol.<sup>203</sup>

Like the *Kyoto Protocol*,<sup>204</sup> the *Montreal Protocol* contains a non-compliance procedure, “the first multilateral environmental agreement to do so.”<sup>205</sup> Article 8 provides:

---

<sup>193</sup> See Rowlands, *supra* note 5 at 323.

<sup>194</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 92; *Montreal Protocol*, *supra* note 27, arts 2(9), 6. See the amended Article 2, paragraph 9, and Article 6 in *Handbook for the Montreal Protocol*, *supra* note 163 at 5, 18.

<sup>195</sup> See Birnie, Boyle & Redgwell, *supra* note 5 at 92.

<sup>196</sup> See *ibid.*

<sup>197</sup> See *ibid.*

<sup>198</sup> See *Montreal Protocol*, *supra* note 27, Annexes A–C, E; *Handbook for the Montreal Protocol*, *supra* note 163, section 1.2.

<sup>199</sup> See *Montreal Protocol*, *supra* note 27, art 2; Arnold W Reitze, “Air and Climate Change” in Roger R Martella & J Brett Grosko, eds, *International Environmental Law: The Practitioner’s Guide to the Laws of the Planet* (Chicago: American Bar Association, 2014) 61 at 68.

<sup>200</sup> For more information, see *Handbook for the Montreal Protocol*, *supra* note 163 at 170–73, 268–69, 523.

<sup>201</sup> See *Montreal Protocol*, *supra* note 27, art 7.

<sup>202</sup> See *ibid.*, art 4.

<sup>203</sup> See *ibid.*, art 4B in *Handbook for the Montreal Protocol*, *supra* note 163 at 14–15.

<sup>204</sup> See *Kyoto Protocol*, *supra* note 21, art 18.

<sup>205</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 353 [footnote omitted]. See also Rowlands, *supra* note 5 at 324.



The Parties, at their first meeting, shall consider and approve procedures and institutional mechanisms for determining non-compliance with the provisions of this Protocol and for treatment of Parties found to be in non-compliance.<sup>206</sup>

Concerning this procedure, Birnie, Boyle and Redgwell argue that, “although the non-compliance procedure is an example of ‘soft enforcement’, it is not without teeth, and it has enabled the parties to give serious and sustained attention to their responsibility for reviewing implementation” of the Protocol.<sup>207</sup>

The Parties to the *Montreal Protocol* are required to cooperate in promoting research, development, and exchange of information on:

- best technologies for improving the containment, recovery, recycling or destruction of controlled substances;
- possible alternatives to controlled substances, to products containing such substances, and to products manufactured with them; and
- costs and benefits of relevant control strategies.<sup>208</sup>

Furthermore, cooperation in promoting public awareness of the environmental effects of the emissions of controlled substances and other substances that deplete the ozone layer is made obligatory under the Protocol.<sup>209</sup> Article 10 details the financial mechanism under the Protocol.<sup>210</sup> According to Article 10A, all the Parties are obliged to take “every practicable step” to ensure the expeditious transfer of best available, environmentally safe substitutes, and related technologies under fair and most favorable conditions to developing State Parties.<sup>211</sup> Like the *UNFCCC*, the *Kyoto Protocol*, and the *Vienna Convention*,<sup>212</sup> the *Montreal Protocol* provisions are binding on the Parties since no reservations can be made thereto.<sup>213</sup> To date, four amendments to the Protocol have been made.<sup>214</sup>

---

<sup>206</sup> *Montreal Protocol*, *supra* note 27, art 8.

<sup>207</sup> Birnie, Boyle & Redgwell, *supra* note 5 at 354.

<sup>208</sup> See *Montreal Protocol*, *supra* note 27, art 9(1).

<sup>209</sup> See *ibid*, arts 9(2), 10(1).

<sup>210</sup> See *ibid*, art 10; *Handbook for the Montreal Protocol*, *supra* note 163 at 19–21. The inclusion of this financial mechanism resulted in the ratification of the *Montreal Protocol* by developing States. See Feja Lesniewska, “Filling the Holes: the Montreal Protocol’s Non-Compliance Mechanism” in Malgosia Fitzmaurice, David M Ong & Panos Merkouris, eds, *Research Handbook on International Environmental Law* (Cheltenham, UK: Edward Elgar, 2010) 471 at 475.

<sup>211</sup> *Handbook for the Montreal Protocol*, *supra* note 163 at 21.

<sup>212</sup> See *UNFCCC*, *supra* note 1, art 24; *Kyoto Protocol*, *supra* note 21, art 26; *Vienna Convention*, *supra* note 26, art 18.

<sup>213</sup> See *Montreal Protocol*, *supra* note 27, art 18.

<sup>214</sup> See *Handbook for the Montreal Protocol*, *supra* note 163 at 643.

Like the *Vienna Convention*, the *Montreal Protocol* and all its four amendments have 197 Parties and, hence, have achieved universal ratification.<sup>215</sup> The ozone depletion regime, particularly the *Montreal Protocol*, is widely viewed as one of the most successful and effective multilateral environmental agreements.<sup>216</sup> The Protocol is, according to Lesniewska, “without doubt a landmark environmental agreement within the development of international environmental law.”<sup>217</sup> Rowlands argues that, “[w]hile there is not universal agreement whether the...Protocol is the world’s first ‘precautionary treaty’ or simply ‘one of the first to perceive the need for preventive action in advance of firm proof of actual harm,’ there is more widespread agreement that it helped to advance the use of the precautionary approach in international environmental law.”<sup>218</sup> However, the Protocol’s “success is difficult to transfer to other environmental problems”, since such success can be attributable to the following factors: “CFCs were produced by a very small number of facilities, less damaging technology was available, and[, most importantly,] the industry supported the Protocol”.<sup>219</sup>

### **3.2.1.3 Transboundary air pollution regime**

The first international legally binding instrument to address the issue of air pollution is the *Long-Range Transboundary Air Pollution Convention [LRTAP]* concluded in 1979.<sup>220</sup> The *LRTAP* addresses long-range transboundary air pollution. Although not dubbed a framework treaty, the Convention mainly provides for a framework for future agreements to, among others, address specific pollutants and set strict reduction limits.<sup>221</sup> To date, eight protocols have been

---

<sup>215</sup> See UNEP, Ozone Secretariat, “Treaties and Decisions”, online: UNEP <[ozone.unep.org/en/treaties.php](http://ozone.unep.org/en/treaties.php)>.

<sup>216</sup> See David Hunter, James Salzman & Durwood Zaelke, *International Environmental Law and Policy*, 4th ed (New York: Thomson Reuters/Foundation Press, 2011) at 532; Lesniewska, *supra* note 210 at 471.

<sup>217</sup> Lesniewska, *supra* note 210 at 474. See also Anthony Aust, *Handbook of International Law*, 2nd ed (New York: Cambridge University Press, 2010) (“[t]he [Montreal] Protocol has so far been largely successful, and, if it continues to make progress, in only about thirty-five years from now the hole in the ozone layer over Antarctica could have closed” at 313).

<sup>218</sup> Rowlands, *supra* note 5 at 324–25 [footnotes omitted].

<sup>219</sup> Reitze, *supra* note 199 at 69.

<sup>220</sup> See *Convention on Long-Range Transboundary Air Pollution*, 13 November 1979, 1302 UNTS 217, Can TS 1983 No 34 (entered into force 16 March 1983) [*LRTAP*]; UN Economic Commission for Europe, “The Convention: The 1979 Geneva Convention on Long-range Transboundary Air Pollution”, online: UNECE <[www.unece.org/fr/env/lrtap/lrtap\\_h1.html](http://www.unece.org/fr/env/lrtap/lrtap_h1.html)>.

<sup>221</sup> See e.g. Hunter, Salzman & Zaelke, *supra* note 216 at 526.

concluded.<sup>222</sup> Among those, two protocols address sulfur dioxide (SO<sub>2</sub>) emissions,<sup>223</sup> one addresses nitrogen oxides (NO<sub>x</sub>) emissions,<sup>224</sup> one addresses volatile organic compounds (VOC) emissions,<sup>225</sup> one addresses emissions of persistent organic pollutants (POPs),<sup>226</sup> and one addresses acidification, eutrophication and ground-level ozone.<sup>227</sup>

The transboundary air pollution regime precedes both the ozone depletion regime and the climate change regime. However, the *LRTAP* is regional, not global, in nature.<sup>228</sup> Additionally, the Convention along with its protocols do not address emissions from aviation. Therefore, further discussion of the provisions of the Convention is not offered here.

#### **3.2.1.4 Conclusion**

It can be observed from the above discussion that none of the above international agreements specifically addresses the issue of emissions from international civil aviation that can contribute to and accelerate climate change and global warming. To some extent the *UNFCCC* deals with the issue of emissions from aviation by providing that all Parties to the Convention, whether developed or developing States, are committed to promote and cooperate, *inter alia*, in the development, application and diffusion of technologies, practices, and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>229</sup> in all relevant sectors, including transportation.<sup>230</sup> The *Kyoto Protocol* identified the

---

<sup>222</sup> See UN Economic Commission for Europe, "Protocols", online: UNECE <[www.unece.org/fr/env/lrtap/status/lrtap\\_s.html](http://www.unece.org/fr/env/lrtap/status/lrtap_s.html)>.

<sup>223</sup> Those protocols are: *Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent*, 8 July 1985, 1480 UNTS 215; *Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Further Reduction of Sulphur Emissions*, 14 June 1994, 2030 UNTS 122.

<sup>224</sup> That protocol is: *Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes*, 31 October 1988, 1593 UNTS 287.

<sup>225</sup> That protocol is: *Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes*, 18 November 1991, 2001 UNTS 187.

<sup>226</sup> That protocol is: *Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants*, 24 June 1998, 2230 UNTS 79.

<sup>227</sup> That protocol is: *Protocol to the 1979 Convention on Long-range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone*, 30 November 1999, 2319 UNTS 81.

<sup>228</sup> Except Canada and the US, all the Parties to the *LRTAP* are European States. The European Union is a Party as well. The Convention has 51 Parties. For more information regarding the status of the Convention, see online: UN Treaty Collection <[treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-1&chapter=27&lang=en](http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-1&chapter=27&lang=en)>.

<sup>229</sup> *Montreal Protocol*, *supra* note 27.

<sup>230</sup> See *UNFCCC*, *supra* note 1, art 4(1)(c).

transportation sector as a sector where measures related to emissions reductions can be implemented.<sup>231</sup> Nevertheless, it requires the Annex I Parties to pursue the limitation or reduction of emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>232</sup> from aviation bunker fuels by working through ICAO,<sup>233</sup> thereby providing a clear mandate for ICAO to be the authoritative body for aviation environmental issues related to climate change and global warming.<sup>234</sup>

Both the *UNFCCC* and the *Kyoto Protocol* exclude those greenhouse gases controlled by the *Montreal Protocol*. This exclusion signifies that the *Montreal Protocol* governs the emissions of those controlled gases from the transportation sector. More particularly, it can be inferred from Article 2, paragraph 2 of the *Kyoto Protocol* that the *Montreal Protocol* governs emissions from aviation to the extent that emissions of all greenhouse gases controlled by the *Montreal Protocol* are concerned. In reality, as mentioned, the *Montreal Protocol* regulates, and requires a phased reduction of, 95 ozone-depleting substances, and, thus, applies to aviation as far as these controlled substances are concerned. Nevertheless, unlike the *UNFCCC* and the *Kyoto Protocol*, the *Montreal Protocol* does not explicitly mention transportation, and, unlike the *Kyoto Protocol*, aviation. In addition, these 95 ozone-depleting substances (which are grouped as CFCs, halons, other fully halogenated CFCs, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, and methyl bromide) do not include those gases emitted by aircraft engines (CO<sub>2</sub>, water vapor (H<sub>2</sub>O), NO<sub>x</sub>, sulfur oxides (SO<sub>x</sub>O), and soot)<sup>235</sup> which are of relevance to climate change and global warming. Therefore, the ozone-depletion regime at its present state does not address emissions from international civil aviation that contribute to climate change and global warming.

A binding climate change agreement is expected to be signed at the end of 2015 in Paris. As noted, a firm timetable to adopt this climate agreement was agreed by States at the UNFCCC COP 18 where, among other things, they launched the Kyoto second commitment period. However, as is apparent from the draft negotiating text, emissions from international civil aviation

---

<sup>231</sup> See *Kyoto Protocol*, *supra* note 21, art 2(1)(a)(vii); Dempsey, *supra* note 15 at 450.

<sup>232</sup> *Montreal Protocol*, *supra* note 27.

<sup>233</sup> See *Kyoto Protocol*, *supra* note 21, art 2(2).

<sup>234</sup> See Dempsey, *supra* note 15 at 450.

<sup>235</sup> For information related to these gases, see ch 2, *above*.

will not be governed by this prospective agreement.<sup>236</sup> According to Article 23bis, State Parties to the agreement would “agree on the need for global sectoral emission reduction targets for international aviation...and on the need for all Parties to work through [ICAO]...to develop global policy frameworks to achieve these targets”.<sup>237</sup> Moreover, pursuant to Article 47.5(b), ICAO would be encouraged “to develop a levy scheme to provide financial support for the Adaptation Fund.”<sup>238</sup>

### **3.2.2 Existing and envisaged global measures to mitigate climate change and global warming: aviation**

#### **3.2.2.1 Chicago Convention of 1944**

The *Chicago Convention* of 1944 governs the area of law in the field of international civil aviation.<sup>239</sup> The 1944 Convention established ICAO,<sup>240</sup> the global forum for cooperation among

---

<sup>236</sup> See *Further advancing the Durban Platform*, UNFCCC COP Dec 1/CP.19, in UNFCCC, *Report of the Conference of the Parties on its nineteenth session, held in Warsaw from 11 to 23 November 2013. Addendum. Part two: Action taken by the Conference of the Parties at its nineteenth session*, UNFCCC Conference of the Parties, 19th Sess, Doc FCCC/CP/2013/10/Add.1 (2014) 3, online: UNFCCC <[unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf](http://unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf)>; *Lima Call for Climate Action*, UNFCCC COP Dec 1/CP.20 in UNFCCC, *Report of the Conference of the Parties on its twentieth session, held in Lima from 1 to 14 December 2014. Addendum. Part two: Action taken by the Conference of the Parties at its twentieth session*, UNFCCC Conference of the Parties, 20th Sess, Doc FCCC/CP/2014/10/Add.1 (2015) 2, online: UNFCCC <[unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf](http://unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf)>. To view the latest draft negotiating text, see UNFCCC, *Negotiating text* (advance unedited version 12 February 2015), Work of the Contact Group on Item 3, Ad Hoc Working Group on the Durban Platform For Enhanced Action, 2nd Sess, Part 8 (2015), online: UNFCCC <[unfccc.int/files/bodies/awg/application/pdf/negotiating\\_text\\_12022015@2200.pdf](http://unfccc.int/files/bodies/awg/application/pdf/negotiating_text_12022015@2200.pdf)> (visited August 20, 2015) [*Draft Negotiating Text*].

<sup>237</sup> *Draft Negotiating Text*, *supra* note 236, art 23bis.

<sup>238</sup> *Ibid*, art 47.5(b). ICAO has persistently raised its objection against this provision. See *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A38-18, 38th Sess, ICAO Doc 10022, I-68 at I-73, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)> [*ICAO Res A38-18*]; ICAO Council, *Environmental Protection – Developments in other United Nations Bodies and International Organizations*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 32, Doc A38-WP/32/Ex/27 (18 July 2013) at 1, 4, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp032\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp032_en.pdf)>; ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 42nd Sess, Agenda Item 8(c), Paper No 1, Doc FCCC/SBSTA/2015/MISC.4 (27 May 2015) 3 at 7, online: UNFCCC <[unfccc.int/resource/docs/2015/sbsta/eng/misc04.pdf](http://unfccc.int/resource/docs/2015/sbsta/eng/misc04.pdf)>; ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 39th Sess, Agenda Item 11(f), Paper No 1, Doc FCCC/SBSTA/2013/MISC.20 (10 November 2013) 3 at 6–7, online: UNFCCC <[unfccc.int/resource/docs/2013/sbsta/eng/misc20.pdf](http://unfccc.int/resource/docs/2013/sbsta/eng/misc20.pdf)>; ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 37th Sess, Agenda Item 11(d), Paper No 1, Doc FCCC/SBSTA/2012/MISC.20 (15 November 2012) 3 at 6–7, online: UNFCCC <[unfccc.int/resource/docs/2012/sbsta/eng/misc20.pdf](http://unfccc.int/resource/docs/2012/sbsta/eng/misc20.pdf)>.

<sup>239</sup> *Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295, Can TS 1944 No 36, ICAO Doc 7300/9 [*Chicago Convention*].

<sup>240</sup> See *ibid*, art 43.

its 191 Member States in all fields of civil aviation,<sup>241</sup> and is the primary source of public international air law.<sup>242</sup> The Convention is often regarded as the “Constitution”<sup>243</sup> of international civil aviation, and it is argued that “any chronological review of the development of international aviation law must begin with” the *Chicago Convention*.<sup>244</sup> Therefore, the discussion on existing and envisaged global measures to mitigate climate change and global warming in the field of aviation should commence with the discussion of the *Chicago Convention*.

The *Chicago Convention* was signed on 7 December 1944, i.e. during the first stage of the development of international environmental law when environmental costs and benefits were regarded as incidental to mainly economic concerns.<sup>245</sup> Emissions from aviation “emerged as a problem in the 1970s.”<sup>246</sup> Therefore, it can be easily appreciated that the need to protect the environment was not envisaged at the time of negotiation and drafting of the Convention in 1944 and, hence, no explicit provisions on environmental protection were incorporated therein.<sup>247</sup> However, the Convention tacitly confers responsibility on ICAO to address aviation environmental issues. According to Article 44, one of the aims and objectives of ICAO is:

to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to... promote generally the development of all aspects of international civil aeronautics.<sup>248</sup>

Since reducing environmental impacts of aviation to ensure protection of the environment is one

---

<sup>241</sup> See ICAO, “Vision & Mission”, online: ICAO <[www.icao.int/about-icao/Pages/vision-and-mission.aspx](http://www.icao.int/about-icao/Pages/vision-and-mission.aspx)>.

<sup>242</sup> See generally Michael Milde, *International Air Law and ICAO* in Marietta Benkő, ed, *Essential Air and Space Law*, vol 4 (Utrecht: Eleven International Publishing, 2008) at 17 [Milde, *International*]. Giemulla admired the *Chicago Convention* by stating that:

Legal globalization of aviation is only possible under the principle of ‘internationalism’ (as opposed to ‘supranationalism’) through the following:

- a convention in which the members pledge to comply with or implement decisions reached together (by majority). In aviation, this is of course the Chicago Convention;
- an organization that can reach such decisions. In aviation, this is of course the ICAO[.]

Elmar M Giemulla, “Chapter 1: Chicago System: Genesis and Main Characteristics” in Elmar M Giemulla & Ludwig Weber, eds, *International and EU Aviation Law: Selected Issues* (AH Alphen aan den Rijn: Kluwer Law International, 2011) 3 at 5 [footnotes omitted].

<sup>243</sup> Dempsey, *supra* note 15 at 69; Pablo Mendes de Leon, “Enforcement of the EU ETS: The EU’s Convulsive Efforts to Export its Environmental Values” (2012) 37 *Air & Space L* 287 at 289 (Kluwer Law Online).

<sup>244</sup> Dempsey, *supra* note 15 at 69.

<sup>245</sup> See Redgwell, “International”, *supra* note 5 at 687, 690.

<sup>246</sup> Dempsey, *supra* note 15 at 444.

<sup>247</sup> See also ICAO, *The Convention on International Civil Aviation: Annexes 1 to 18*, online: ICAO <[www.icao.int/safety/airnavigation/NationalityMarks/annexes\\_booklet\\_en.pdf](http://www.icao.int/safety/airnavigation/NationalityMarks/annexes_booklet_en.pdf)> [ICAO, *Annexes 1 to 18*].

<sup>248</sup> *Chicago Convention*, *supra* note 239, art 44(i).

of the aspects of international civil aeronautics,<sup>249</sup> it follows that ICAO has a duty to regulate emissions from international civil aviation.<sup>250</sup>

The *Chicago Convention* facilitates the adoption of international standards and recommended practices [SARPs] as Annexes to the Convention by the ICAO Council, in accordance with Article 90,<sup>251</sup> to address new issues to meet the current global need.<sup>252</sup> The ICAO Council is bound to adopt SARPs in accordance with the provisions of Chapter VI of the Convention,<sup>253</sup> i.e. Articles 37 – 42. Among these provisions, Article 37 provides guidelines regarding such adoption: each Contracting State “undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation”.<sup>254</sup> To this end, ICAO has an obligation to “adopt and amend from time to time, as may be necessary, international standards and recommended practices and procedures dealing with” communications systems, air navigation aids, characteristics of airports and landing areas, rules of the air, air traffic control practices, licensing of personnel, airworthiness of aircraft, registration and identification of aircraft, collection and exchange of meteorological information, log books, aeronautical maps and charts, customs and immigration procedures, aircraft in distress and investigation of accidents, and “*such other matters* concerned with the safety, regularity, and efficiency of air navigation as may from time to time appear appropriate.”<sup>255</sup> The ICAO Council made good use of this authority by adopting Annex 16 to the *Chicago Convention* to address aviation environmental issues.<sup>256</sup> The SARPs are designated as Annexes to

---

<sup>249</sup> In fact, environmental protection is one of the five strategic objectives of ICAO for the 2014–2016 triennium. See ICAO, “ICAO Strategic Objectives 2014–2016”, online: ICAO <[www.icao.int/about-icao/Pages/Strategic-Objectives.aspx](http://www.icao.int/about-icao/Pages/Strategic-Objectives.aspx)>.

<sup>250</sup> See Armand de Mestral & Md Tanveer Ahmad, “A Pre-Analysis of Canada–EU Aviation Relations post-ICAO Assembly Meeting Concerning Emissions Trading System”, Policy Brief, Carleton University Canada-Europe Transatlantic Dialogue (April 2013) at 2, online: Carleton University <[labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2013-04-brief-demestral-ahmad-mcgill-aviation-emissions.pdf](http://labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2013-04-brief-demestral-ahmad-mcgill-aviation-emissions.pdf)>.

<sup>251</sup> According to *Chicago Convention*, *supra* note 239, art 90, the adoption of the Annexes requires the vote of two-thirds of the ICAO Council at a meeting called for that purpose and shall then be submitted by the Council to each Contracting State, and that Annex or any amendment thereto shall become effective within 3 months after its submission to the Contracting States or at the end of such longer period of time as the Council may prescribe, unless in the meantime majority of the Contracting States register their disapproval with the Council.

<sup>252</sup> See *ibid*, art 37.

<sup>253</sup> See *ibid*, art 54(1).

<sup>254</sup> *Ibid*, art 37.

<sup>255</sup> *Ibid* [emphasis added].

<sup>256</sup> For a brief discussion on Annex 16, see ICAO, *Annexes 1 to 18*, *supra* note 247.

the *Chicago Convention* for convenience.<sup>257</sup> However, unlike the environmental treaties discussed above, Annexes to the *Chicago Convention* do not actually become part of the Convention.<sup>258</sup>

### **3.2.2.2 Annex 16 to the Chicago Convention**

Annex 16, divided into two volumes, addresses aviation environmental issues. Volume I of Annex 16 deals exclusively with the protection of the environment from the effect of aircraft noise, and Volume II is devoted to addressing the issue of aircraft engine emissions and, therefore, deserves a brief discussion.<sup>259</sup>

Part II of Volume II contains standards relating to vented fuel with regard to all turbine engine powered aircraft intended for operation in international air navigation manufactured after 18 February 1982.<sup>260</sup> This Part requires that the design and construction of an aircraft has to be such as to prevent the intentional discharge into the atmosphere of liquid fuel from the fuel nozzle manifolds resulting from the process of engine shutdown following normal flight or ground operations.<sup>261</sup>

Part III contains standards relating to emissions certification applicable to the types of aircraft engines specified in the individual chapters of the Part, “where such engines are fitted to aircraft engaged in international civil aviation.”<sup>262</sup> Standards are defined as “[a]ny specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the [Chicago] Convention”.<sup>263</sup> Emissions certification shall be granted on the basis of satisfactory evidence that the engine complies with the minimum requirements set by the provisions of Annex 16, Volume II.<sup>264</sup>

---

<sup>257</sup> See *Chicago Convention*, *supra* note 239, art 54(1).

<sup>258</sup> See Dempsey, *supra* note 15 at 75; Michael Milde, “Aviation Safety Oversight: Audits and the Law” (2001) 26 *Ann Air & Sp L* 165 at 168 [Milde, “Aviation”].

<sup>259</sup> ICAO, (2014) 7 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 1, Aircraft Noise; ICAO, (2008) 3 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 2, Aircraft Engine Emissions [*Annex 16: Volume 2*].

<sup>260</sup> See *Annex 16: Volume 2*, *supra* note 259 at ix, II-1-1.

<sup>261</sup> See *ibid* at II-2-1.

<sup>262</sup> *Ibid* at ix.

<sup>263</sup> *Ibid* at x.

<sup>264</sup> See *ibid* at III-1-1.



Chapter 2 of Part III deals with turbojet and turbofan engines intended for propulsion only at subsonic speeds, and Chapter 3 deals with turbojet and turbofan engines intended for propulsion at supersonic speeds. For the emissions certification for all types of engines, the following emissions shall be controlled: smoke and three gases, namely, unburned hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO<sub>x</sub>).<sup>265</sup> Smoke emissions are measured and reported in terms of Smoke Number (SN),<sup>266</sup> and the mass (D<sub>p</sub>) of the gaseous pollutant HC, CO or NO<sub>x</sub> emitted during the reference emissions landing and take-off [LTO] cycle are measured and reported in grams.<sup>267</sup> Regulatory Smoke Number and regulatory gaseous emission levels for different engines are specifically defined.<sup>268</sup> A certificate of compliance is issued if the mean of the values measured and corrected for all the engines tested does not exceed the regulatory level.<sup>269</sup>

Certainly, a question arises whether or not Volume II of Annex 16 can resolve the difficulty of the absence of a legally binding comprehensive international instrument dealing with climate change and global warming in the field of aviation. The answer will be in the negative for various reasons. First and foremost, Annexes to the *Chicago Convention* are not mandatory like the provisions of the Convention since, as noted earlier, Annexes do not become part of the Convention.<sup>270</sup> In fact, neither their adoption nor their legal force are “subject to the general international law of treaties.”<sup>271</sup>

The Contracting States to the *Chicago Convention* are required to adopt measures to ensure that all aircraft flying over or maneuvering within its territory or carrying their nationality mark shall comply with the rules and regulations relating to the flight and maneuver of aircraft there in force.<sup>272</sup> In these respects, all the Contracting States undertake to keep its own regulations “uniform, to the greatest possible extent, with those established from time to time under this

---

<sup>265</sup> See *ibid* at III-2-1, III-3-1.

<sup>266</sup> See *ibid* at III-2-1, III-3-1.

<sup>267</sup> See *ibid*.

<sup>268</sup> See *ibid* at III-2-3ff, III-3-3.

<sup>269</sup> See *ibid* at App 6-1.

<sup>270</sup> See Milde, “Aviation”, *supra* note 258 at 168. See also *New Zealand Airline Pilots’ Association v Attorney General*, [1997] 3 NZLR 269 (CA). Milde, *International*, *supra* note 242 at 18, observes that “[t]he provisions of [Chicago] Convention are mandatory since there is no provision permitting any reservations to the Convention. The mandatory nature of the Convention is underlined by Article 82 in which contracting states committed themselves to abrogate any inconsistent obligations and understandings and not to enter into any such obligations or understanding.” [footnote omitted].

<sup>271</sup> Milde, “Aviation”, *supra* note 258 at 168.

<sup>272</sup> See *Chicago Convention*, *supra* note 239, art 12.

Convention”,<sup>273</sup> i.e. with SARPs promulgated by ICAO. Nevertheless, two articles of the Convention, namely, Articles 37 and 38, weaken the binding nature of the Annexes. Both articles allow any Contracting State to the Convention to avoid implementing the Annexes.<sup>274</sup> Article 37 invites all the Contracting States “to collaborate in securing the *highest practicable degree of uniformity* in regulations, standards, procedures, and organization”.<sup>275</sup> However, any State can refrain from doing everything possible by it since the phrase “highest practicable degree of uniformity” has not been defined.<sup>276</sup> Article 38 allows deviation from any standard or procedure of any Annexes or any amendment thereto by any Contracting State.<sup>277</sup> According to Article 38, if any State finds it “impracticable to comply in all respects” with any of those standards or procedures, it merely has to notify ICAO of the discrepancy between its own practice and the respective standard or procedure.<sup>278</sup> Furthermore, the Convention provides no guidance with respect to the meaning of the term “impracticable”.<sup>279</sup> Again, although the deviating Contracting State must give “immediate notification” to ICAO of such “differences between its own practice and that established by the international standard”,<sup>280</sup> the concerned State can avoid notifying since no defined time limit is set for that purpose.<sup>281</sup> The Convention is silent on the definition of the term “immediate”.<sup>282</sup> In reality, “States have notified ICAO of impracticality of compliance with SARPs at any time, or indeed not at all, thereby violating the plain meaning of the phrase “immediate notification”.<sup>283</sup> Interestingly, a sixty-day notification requirement is established for filing of differences with regard to any amendment to the Annexes.<sup>284</sup>

Twelve States, including the US, already have notified ICAO of differences which exist between their national regulations and practices and the SARPs of Annex 16, Volume II, by utilizing their authority under Article 38.<sup>285</sup> It cannot be stated with sufficient certainty that only

---

<sup>273</sup> *Ibid* [emphasis added].

<sup>274</sup> See Md Tanveer Ahmad, “Achieving Global Safety in Civil Aviation: A Critical Analysis of Contemporary Safety Oversight Mechanisms” (2012) 37 *Ann Air & Sp L* 81 at 86 [Ahmad, “Achieving”].

<sup>275</sup> *Chicago Convention*, *supra* note 239, art 37 [emphasis added].

<sup>276</sup> See Ahmad, “Achieving”, *supra* note 274 at 86; Milde, “Aviation”, *supra* note 258 at 168–69.

<sup>277</sup> See *ibid*; *Chicago Convention*, *supra* note 239, art 38.

<sup>278</sup> *Chicago Convention*, *supra* note 239, art 38.

<sup>279</sup> See Ahmad, “Achieving”, *supra* note 274 at 86.

<sup>280</sup> *Chicago Convention*, *supra* note 239, art 38.

<sup>281</sup> See *ibid*; Ahmad, “Achieving”, *supra* note 274 at 86.

<sup>282</sup> See *Chicago Convention*, *supra* note 239, art 38.

<sup>283</sup> Dempsey, *supra* note 15 at 77 [footnote omitted].

<sup>284</sup> See *Chicago Convention*, *supra* note 239, art 38.

<sup>285</sup> See ICAO, “Supplement to Annex 16, Volume II (Second Edition)” in *Annex 16: Volume 2*, *supra* note 259.

those twelve States are not complying with Annex 16, Volume II. Because only seventeen States have so far notified ICAO that no differences exist, while a large number of States remains silent.<sup>286</sup> In fact, the overwhelming majority of States do not discharge their obligation to notify ICAO of differences between the SARPs set forth in the Annexes and their domestic legislation.<sup>287</sup> ICAO itself admitted this unexpected fact.<sup>288</sup> Most importantly, “[t]here is no explicit sanction in the Convention for failing to notify.”<sup>289</sup> Regarding the obligatory nature of the Annexes, Judge Thomas Buergenthal notes:

With some exceptions..., the Contracting States have no legal obligation to implement or to comply with the provisions of a duly promulgated Annex or amendment thereto, unless they find it “practicable” to do so. This conclusion is supported both by the language of the Convention as well as by the practice of [ICAO].<sup>290</sup>

Nevertheless, Professor Dempsey argues that “whatever *de jure* “soft law” attributes SARPs may have, they appear to have corresponding *de facto* “hard law” attributes as well.”<sup>291</sup> This is due to the authority granted to the Contracting States by Article 33 to refuse to recognize certificates of airworthiness, and certificates of competency and licenses issued or rendered valid by another Contracting State if they do not meet the minimum standards established from time to time pursuant to this convention.<sup>292</sup> Professor Dempsey notes:

[A] State fails to comply with the SARPs at its own peril, for... there are implicit sanctions that are potentially severe. Pursuant to Article 33 of the Chicago Convention, a State that fails to comply may find its airman, aircraft, air carrier, and/or airport certifications and licenses not recognized as valid by a foreign government, thereby terminating their operation to, from, or through foreign territories, isolating it from the global economy. When economically powerful States, such as the United States and the European Union,

---

<sup>286</sup> See *ibid.*

<sup>287</sup> See Dempsey, *supra* note 15 at 78.

<sup>288</sup> See Milde, “Aviation”, *supra* note 258 (“a Secretariat document in 1995 admitted that “it is at the present time impossible to indicate with any degree of accuracy or certainty what the state of implementation of regulatory Annex material really is, because a large number of States have not notified ICAO of their compliance with or differences to the Standards in the Annexes for some considerable time.”) at 170 [footnote omitted].

<sup>289</sup> Dempsey, *supra* note 15 at 79 [footnote omitted].

<sup>290</sup> Thomas Buergenthal, *Law-Making in the International Civil Aviation Organization* in Richard B Lillich, ed, *Procedural Aspects of International Law Series*, vol 7 (New York: Syracuse University Press, 1969) at 76 [footnote omitted]. These exceptions are discussed in Chapter 6. See ch 6, *below*.

<sup>291</sup> Dempsey, *supra* note 15 at 79–80 [footnote omitted] [emphasis in original]. Similarly, Milde, “Aviation”, *supra* note 258 at 169, argues that “in practice there is a powerful motivation for all States wishing to participate in international air transport to comply with such standards as closely as possible. The fact remains that these standards cannot be disregarded with impunity, and a phrase has been coined that their force can be compared with that of the “law of gravity”: compliance is simply unavoidable in practice.”

<sup>292</sup> See *Chicago Convention*, *supra* note 239, art 33.

blacklist a nation's carriers, the economic impact can be severe.<sup>293</sup>

It is apparent that Annexes are *de facto* “hard law” and, hence, Volume II of Annex 16 or any amendment thereto will force the Contracting States to comply with that. Importantly, Volume II of Annex 16 is considered as one of the multilateral agreements relating to air pollution by the International Law Commission.<sup>294</sup> However, Annexes should be made *de jure* “hard law” to ensure more effectiveness, given the fact that, in the case of Annex 16, Volume II, the US itself, utilizing the provision under Article 38 of the Convention, has notified ICAO of differences which exist between their national regulations and practices and the SARPs of that volume.

Furthermore, Annex 16 suffers from the lack of modern effective provisions dealing with the issues of climate change and global warming.<sup>295</sup> It appears that, although the *Kyoto Protocol* provides a clear mandate for ICAO to limit or reduce emissions of greenhouse gases not controlled by the *Montreal Protocol* from international civil aviation,<sup>296</sup> the Organization has not yet discharged this duty by adding all the greenhouse gases emitted by aircraft, which are required to be controlled under the *Kyoto Protocol*, in the list of controlled gases in Annex 16, Volume II.<sup>297</sup> Most importantly, two major greenhouse gases emitted by aircraft, namely, carbon dioxide (CO<sub>2</sub>) and water vapor (H<sub>2</sub>O), are not being regulated by Annex 16. In reality, Volume II was “originally designed to respond to concerns regarding air quality in the vicinity of airports” and, hence, it established limits for emissions of unburned hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides (NO<sub>x</sub>) “for a reference landing and take-off...cycle below 915 [meters] of altitude (3000 ft)”.<sup>298</sup> Amendments to Annex 16 or the adoption of a new Annex to address climate change and global warming are imperative and should commence immediately.

### **3.2.2.3 Other ICAO initiatives**

Since the *Chicago Convention* and Annex 16 to the Convention do not sufficiently address

---

<sup>293</sup> Dempsey, *supra* note 15 at 79 [footnote omitted]. See also Milde, “Aviation”, *supra* note 258 (“[n]on-compliance with SARPs may eliminate the State concerned from any meaningful participation in international air navigation and air transport, as a deficiency in airports or ATC, communications or navigational aids could compel foreign operators to avoid the airspace and airports of a particular country for safety and insurance reasons” at 169).

<sup>294</sup> See ILC, *First Report*, *supra* note 90 at 19.

<sup>295</sup> See also Dempsey, *supra* note 15 at 455–58.

<sup>296</sup> See *Kyoto Protocol*, *supra* note 21, art 2(2).

<sup>297</sup> For the list of gases, see ch 2, *above*.

<sup>298</sup> ICAO, “Technology Standards”, online: ICAO <[www.icao.int/environmental-protection/Pages/technology-standards.aspx](http://www.icao.int/environmental-protection/Pages/technology-standards.aspx)> [ICAO, “Technology”].

the issues of climate change and global warming, ICAO has taken several initiatives to address the same. The Organization adopted the Programme of Action on International Aviation and Climate Change [PAIACC] in June 2009, which included the following admirable elements:<sup>299</sup>

- a) a 2 percent annual improvement target in fuel efficiency globally until the year 2050;
- b) a decision to develop global CO<sub>2</sub> standards for aircraft;
- c) a decision to develop a framework for market-based measures<sup>300</sup> for international aviation;
- d) measures to assist developing States and to facilitate access to financial resources, technology transfer, and capacity-building;
- e) collection of international aviation emissions data by ICAO;
- f) development and submissions to ICAO of States' voluntary action plans on emissions; and
- g) continued work on alternative fuels for aviation.<sup>301</sup>

The mandate to develop the PAIACC emerged during the 36<sup>th</sup> Session of the ICAO Assembly in September 2007 at which the Assembly called for the formation of the Group on International Aviation and Climate Change [GIACC] with this mandate.<sup>302</sup> Subsequently, the Group was formed in January 2008 which developed the PAIACC and submitted it to the ICAO Council for consideration.<sup>303</sup> The GIACC further recommended, among others, for the convening of the High-level Meeting on International Aviation and Climate Change [HLM-ENV].<sup>304</sup> The ICAO Council fully accepted the PAIACC, and this decision of the Council was welcomed by the HLM-ENV, held by ICAO in October 2009.<sup>305</sup> The HLM-ENV reaffirmed ICAO's leading role in international aviation matters, and approved a Declaration as well as Recommendations concerning further work for the Council on international civil aviation and climate change.<sup>306</sup> The

---

<sup>299</sup> ICAO Secretariat, "ICAO Programme of Action on International Aviation and Climate Change" in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 8 at 8 [ICAO Secretariat, "ICAO Programme"].

<sup>300</sup> See e.g. ICAO, "Market-Based Measures", online: ICAO <[www.icao.int/environmental-protection/Pages/market-based-measures.aspx](http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx)> [ICAO, "Market-Based Measures"].

<sup>301</sup> See ICAO Secretariat, "ICAO Programme", *supra* note 299 at 8.

<sup>302</sup> See *ibid.*

<sup>303</sup> See *ibid.*

<sup>304</sup> See *ibid.*

<sup>305</sup> See *ibid.*; *Declaration by the High-level Meeting on International Aviation and Climate Change (HLM-ENV/09) in October 2009*, in ICAO, "Climate Change: Programme of Action", online: ICAO <[www.icao.int/environmental-protection/Pages/programme-of-action.aspx](http://www.icao.int/environmental-protection/Pages/programme-of-action.aspx)> [ICAO, "Climate Change: Programme of Action"].

<sup>306</sup> See ICAO Secretariat, "ICAO Programme", *supra* note 299 at 8. To view the Declaration and the Recommendations, see ICAO, "Climate Change: Programme of Action", *supra* note 305.

HLM-ENV, in fact, agreed on the PAIACC elements, mentioned above.<sup>307</sup> ICAO claimed this as “the first globally-harmonized agreement on a goal that addresses climate impacts from a specific sector.”<sup>308</sup>

In 2010, the ICAO Assembly adopted Resolution A37-19 to limit or reduce emissions from aviation that contribute to climate change.<sup>309</sup> Resolution A37-19, claimed to be a “historic”<sup>310</sup> agreement by ICAO and “historic decision”<sup>311</sup> by the International Air Transport Association [IATA], was built on achievements since the 36<sup>th</sup> Session of the ICAO Assembly in 2007. Thus, the Resolution included the following elements, mostly borrowed from the PAIACC, and the Declaration and Recommendations of the HLM-ENV:

- a) a global goal of 2 percent annual fuel efficiency improvement up to the year 2050;
- b) a global framework for the development and deployment of sustainable alternative fuels for aviation;
- c) a target of 2013 for a CO<sub>2</sub> standard for aircraft engines;
- d) the development of a framework for market-based measures;
- e) a feasibility study on the creation of a global market-based measure scheme and guiding principles for States to use when designing and implementing market-based measures for international aviation;
- f) mechanisms for technology transfer to developing States;
- g) a requirement for States to submit to ICAO their action plans for reaching goals set by the Organization;
- h) assistance for States to meet their respective objectives; and
- i) exemptions from market-based measures for States with very low emissions due to their small traffic base.<sup>312</sup>

---

<sup>307</sup> See ICAO Secretariat, “ICAO Programme”, *supra* note 299 at 8; ICAO, “Climate Change: Programme of Action”, *supra* note 305.

<sup>308</sup> ICAO Secretariat, “ICAO Programme”, *supra* note 299 at 8.

<sup>309</sup> See *Consolidated statement of continuing ICAO policies and practices related to environmental protection — Climate change*, ICAO Assembly Res A37-19, 37th Sess, ICAO Doc 9958, I-67, online: ICAO <[www.icao.int/publications/Documents/9958\\_en.pdf](http://www.icao.int/publications/Documents/9958_en.pdf)> [ICAO Res A37-19].

<sup>310</sup> ICAO, Press Release, PIO 14/10, “ICAO Member States Agree to Historic Agreement on Aviation and Climate Change” (8 October 2010), online: ICAO <[www.icao.int/Newsroom/Pages/icao-member-states-agree-to-historic-agreement-on-aviation-and-climate-change.aspx](http://www.icao.int/Newsroom/Pages/icao-member-states-agree-to-historic-agreement-on-aviation-and-climate-change.aspx)>.

<sup>311</sup> International Air Transport Association, Press Release, 46, “IATA Applauds ICAO Agreement on Aviation and Climate Change: Industry Remains Committed to More Ambitious Goals” (8 October 2010), online: IATA <[www.iata.org/pressroom/pr/Pages/2010-10-08-01.aspx](http://www.iata.org/pressroom/pr/Pages/2010-10-08-01.aspx)>.

<sup>312</sup> See ICAO, Press Release, PIO 14/10, *supra* note 310; ICAO Res A37-19, *supra* note 309.

At its eighth meeting in February 2010, ICAO's Committee on Aviation Environmental Protection [CAEP] agreed on a new NO<sub>x</sub> standard that "improves on the current Standard by up to 15 per cent with an effective date of 31 December 2013, as well as a production cut-off engines according to the current Standard with an effective date of 31 December 2012."<sup>313</sup> ICAO adopted more stringent NO<sub>x</sub> standards in 2010.<sup>314</sup> The CAEP also agreed at the same meeting in 2010 to establish a certification requirement for non-volatile particulate matter (PM) emissions by 2013 and a certification standard by 2016.<sup>315</sup>

On July 10, 2012, the CAEP unanimously agreed on a CO<sub>2</sub> metric system that characterizes the CO<sub>2</sub> emissions for aircraft types with varying technologies.<sup>316</sup> Airbus, Boeing, Aerospace Industries Association, IATA, Airlines for America and environmental NGOs commended that agreement.<sup>317</sup> On the contrary, Dimitri Simos of Lissys, a UK company that created the Piano aircraft analysis software which is used to quantify CO<sub>2</sub> emissions in two out of the four greenhouse gas aviation models approved by ICAO, described "the metric as fundamentally flawed, unfit for purpose and a deeply wrong decision."<sup>318</sup> The development of CO<sub>2</sub> certification requirement, including a CO<sub>2</sub> metric system and procedures, has been accomplished.<sup>319</sup> The CAEP has already delivered agreement on the certification procedures.<sup>320</sup> The new CO<sub>2</sub> aircraft standard will result in a new volume, namely Volume III, of Annex 16.<sup>321</sup>

At its 38<sup>th</sup> Session held in 2013, the ICAO Assembly adopted Resolution A38-18 dealing with climate change, which replaced Resolution A37-19.<sup>322</sup> While most features of Resolution A37-19 were retained, Resolution A38-18 is different from Resolution A37-19 in some important

---

<sup>313</sup> ICAO, "Technology", *supra* note 298.

<sup>314</sup> See ICAO, "WG3: Emissions", online: ICAO <[www.icao.int/environmental-protection/Documents/CAEP/Images/WG3-Large.png](http://www.icao.int/environmental-protection/Documents/CAEP/Images/WG3-Large.png)> (visited July 29, 2015) [ICAO, "WG3: Emissions"].

<sup>315</sup> See ICAO, "Technology", *supra* note 298.

<sup>316</sup> See ICAO, Press Release, COM 15/12, "New Progress on Aircraft CO<sub>2</sub> Standard" (11 July 2012), online: ICAO <[www.icao.int/Newsroom/Pages/new-progress-on-aircraft-CO2-standard.aspx](http://www.icao.int/Newsroom/Pages/new-progress-on-aircraft-CO2-standard.aspx)>.

<sup>317</sup> See "Agreement reached by ICAO's environmental committee on a metric for defining a CO<sub>2</sub> standard for new aircraft", *GREENAIRonline.com* (13 July 2012), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1568](http://www.greenaironline.com/news.php?viewStory=1568)>.

<sup>318</sup> *Ibid.*

<sup>319</sup> See Jane Hupe, "Aviation and Environment: Developments Since the Last Assembly" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination Green", Montreal, 14 – 16 May 2013) [unpublished] [Hupe, "Aviation"].

<sup>320</sup> See ICAO, Press Release, COM 4/13, "ICAO Environmental Protection Committee Delivers Progress on New Aircraft CO<sub>2</sub> and Noise Standards" (14 February 2013), online: ICAO <[www.icao.int/Newsroom/Pages/ICAO-environmental-protection-committee-delivers-progress-on-new-aircraft-CO2-and-noise-standards.aspx](http://www.icao.int/Newsroom/Pages/ICAO-environmental-protection-committee-delivers-progress-on-new-aircraft-CO2-and-noise-standards.aspx)>.

<sup>321</sup> See ICAO, "Committee on Aviation Environmental Protection (CAEP)", online: ICAO <[www.icao.int/environmental-protection/Pages/Caep.aspx](http://www.icao.int/environmental-protection/Pages/Caep.aspx)>; Hupe, "Aviation", *supra* note 319.

<sup>322</sup> See *ICAO Res A38-18*, *supra* note 238 at I-70.

respects. Most importantly, whereas States agreed to *develop a framework* for market-based measures under Resolution A37-19,<sup>323</sup> States decided to *develop* a global market-based measure for international civil aviation under Resolution A38-18.<sup>324</sup> With respect to the CO<sub>2</sub> aircraft standard, the Assembly requested ICAO Council to “develop a global CO<sub>2</sub> Standard for aircraft aiming to finalize analyses by late 2015 and adoption by the Council in 2016”.<sup>325</sup> Resolution A38-18 is elaborately discussed in the next chapter.<sup>326</sup>

At its 37<sup>th</sup> Session, the ICAO Assembly defined a basket of measures to achieve ICAO’s environmental goals.<sup>327</sup> These measures include three technical measures, namely technology improvements, operational improvements, and sustainable alternative fuels, and one economic measure, namely market-based measures.<sup>328</sup> The basket of measures is also recognized under Resolution A38-18.<sup>329</sup> According to Resolutions A37-19 and A38-18, States are encouraged to submit their action plans “outlining their respective policies and actions, and annual reporting on international aviation CO<sub>2</sub> emissions to ICAO”.<sup>330</sup> These action plans “should include information on the basket of measures considered by States”.<sup>331</sup> The next chapter elaborately considers these four mitigation measures included in the basket.

#### **3.2.2.4 Conclusion**

It appears that the existing multilateral initiatives in the field of aviation cannot significantly contribute to the global initiatives in combating climate change and global warming. The principal difficulty is that no legally binding comprehensive international instrument in the field of international civil aviation to deal with the issues of climate change and global warming is in place now.<sup>332</sup> To this day, ICAO has been successful in adopting only two resolutions of relevance, namely Assembly Resolutions A37-19 and A38-18.<sup>333</sup> However, resolutions cannot

---

<sup>323</sup> See *ICAO Res A37-19*, *supra* note 309 at I-71.

<sup>324</sup> See *ICAO Res A38-18*, *supra* note 238 at I-72.

<sup>325</sup> *Ibid* at I-75.

<sup>326</sup> See ch 4, *below*.

<sup>327</sup> See Jane Hupe, “Towards Environmental Sustainability” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 11 at 11 [*ICAO Environmental Report 2013*].

<sup>328</sup> See *ibid*.

<sup>329</sup> See *ICAO Res A38-18*, *supra* note 238 at I-72.

<sup>330</sup> *ICAO Res A37-19*, *supra* note 309 at I-70; *ICAO Res A38-18*, *supra* note 238 at I-71.

<sup>331</sup> *ICAO Res A37-19*, *supra* note 309 at I-70; *ICAO Res A38-18*, *supra* note 238 at I-72.

<sup>332</sup> See generally Dempsey, *supra* note 15 at 454–58.

<sup>333</sup> *ICAO Res A38-18*, *supra* note 238; *ICAO Res A37-19*, *supra* note 309.



resolve the problem since they are not legally binding on any State *per se*.<sup>334</sup> Both Resolutions A37-19 and A38-18 have received a significant number of reservations.<sup>335</sup> Governing emissions from international civil aviation will be difficult, if not impossible, in the absence of a legally binding deftly drafted international instrument.

This is not to suggest that soft law instruments will be entirely incapable of governing such emissions. At this initial governance stage, soft law instruments hold promise for governing emissions from international civil aviation. The envisaged measures, especially the basket of mitigation measures that includes a global market-based measure for international civil aviation, hold huge prospect in reducing emissions from aviation. Resort can be made to Annexes to the *Chicago Convention*, soft law instrument, to give effect to these envisaged measures, particularly, market-based measures. The following chapters, particularly Chapters 4 and 6, explore various ways how soft law instruments can ensure the effective governance of such emissions.

### **3.3 Existing and envisaged unilateral measures to govern emissions from international civil aviation**

#### **3.3.1 The European Union Emissions Trading System\***

The European Union [EU] Emissions Trading System [ETS] is one of few unilateral environmental measures concerning international civil aviation that are currently in place. The EU was established and conferred legal personality by the *Treaty on European Union [TEU]*.<sup>336</sup> According to the *TEU*, the EU has an obligation “to work for the sustainable development of Europe based on”, *inter alia*, “a high level of protection and improvement of the quality of the environment.”<sup>337</sup> With respect to the world, the EU acts on behalf of its Member States in the pursuit of, among others, common foreign policies, and actions that “ensure sustainable

---

<sup>334</sup> See e.g. Milde, *International*, *supra* note 242 at 169.

<sup>335</sup> See ICAO, “Reservations to Resolution A38-18 (17/2)”, online: ICAO <[www.icao.int/Meetings/a38/Pages/resolutions.aspx](http://www.icao.int/Meetings/a38/Pages/resolutions.aspx)>; ICAO, “Reservations to Resolution A37/19 (17/2)”, online: ICAO <[www.icao.int/Meetings/AMC/Assembly37/Documents/ReservationsResolutions/10\\_reservations\\_en.pdf](http://www.icao.int/Meetings/AMC/Assembly37/Documents/ReservationsResolutions/10_reservations_en.pdf)>.

\* Section 3.3.1 includes excerpts from author’s following article: “Evaluating the Effectiveness of the European Union Emissions Trading System to Reduce Emissions from International Civil Aviation” (2015) 11:1 JSDLP 115.

<sup>336</sup> *Consolidated version of the Treaty on European Union*, 7 February 1992, [2012] OJ, C 326/13, arts 1, 47 [*TEU*].

<sup>337</sup> *Ibid*, art 3(3). “Sustainable development is set out in the Treaty as the overarching long-term goal of the EU.” EC, Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Mainstreaming Sustainable Development into EU Policies: 2009 Review of the European Union Strategy for Sustainable Development*, COM(2009) 400 final (Brussels: EC, 2009) at 2, online: EUR-Lex <[eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009DC0400&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009DC0400&from=EN)>.

development” and aimed at helping to “develop international measures to preserve and improve the quality of the environment”.<sup>338</sup> According to the *Treaty on the Functioning of the EU* [TFEU], which details the policies of the EU, the Union must share competence with its Member States in the areas of, *inter alia*, environment and transport,<sup>339</sup> i.e. the EU and its Member States “may legislate and adopt legally binding acts” in those areas.<sup>340</sup> The TFEU stipulates that environmental protection measures must be an integral part of the “definition and implementation of the [EU’s] policies and activities”,<sup>341</sup> while the EU committed itself to preserve, protect, and improve the quality of the environment, and to promote measures at international level to deal with global environmental problems, in particular, climate change.<sup>342</sup>

The EU approved the *UNFCCC* in December 1993,<sup>343</sup> which requires, as mentioned above, the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.<sup>344</sup> This requirement is often referred to in EU legislation dealing with the ETS.<sup>345</sup> The Union also emphasizes that the Parties to the *UNFCCC* are required “to formulate and implement national and, where appropriate, regional programs containing measures to mitigate climate change.”<sup>346</sup> The EU and its Member States agreed to fulfill their commitments under the *Kyoto Protocol*<sup>347</sup> jointly.<sup>348</sup> Under the Protocol, the Union and its Member States committed to reduce their aggregate anthropogenic greenhouse gas emissions by 8 percent compared to 1990 levels in the 2008 – 2012 period.<sup>349</sup> To

---

<sup>338</sup> *TEU*, *supra* note 336, art 21(2)(f).

<sup>339</sup> See *Consolidated version of the Treaty on the Functioning of the European Union*, 25 March 1957, [2012] OJ, C 326/47, art 4(2) [TFEU].

<sup>340</sup> *Ibid*, art 2(2).

<sup>341</sup> *Ibid*, art 11. See also EC, *Charter of Fundamental Rights of the European Union*, 7 December 2000, [2012] OJ, C 326/391, art 37.

<sup>342</sup> See TFEU, *supra* note 339, art 191(1).

<sup>343</sup> See EC, *Council Decision 94/69/EC of 15 December 1993 concerning the conclusion of the United Nations Framework Convention on Climate Change*, [1994] OJ, L 33/11 at 11.

<sup>344</sup> *UNFCCC*, *supra* note 1, art 2.

<sup>345</sup> See e.g. EC, *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC*, [2003] OJ, L 275/32 at 32 [Directive 2003/87]; EC, *Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, [2009] OJ, L 8/3 at 3 [Directive 2008/101].

<sup>346</sup> *Directive 2008/101*, *supra* note 345 at 4.

<sup>347</sup> *Kyoto Protocol*, *supra* note 21.

<sup>348</sup> See EC, *Council Decision 2002/358/CE of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder*, [2002] OJ, L 130/1.

<sup>349</sup> See *Directive 2003/87*, *supra* note 345 at 32.

discharge all those responsibilities related to climate change arising under the EU Treaties and international agreements, the Union launched the EU ETS in 2005 pursuant to *Directive 2003/87*.<sup>350</sup> Most importantly, the trading system was an effort to contribute to meeting the commitments of the Union and its Member States under the *Kyoto Protocol* more effectively.<sup>351</sup>

International civil aviation has been included within the EU ETS since January 1, 2012 in accordance with *Directive 2008/101*.<sup>352</sup> A binding obligation was imposed on the EU Member States to bring into force national laws, regulations, and administrative provisions required to comply with *Directive 2008/101* before February 2, 2010.<sup>353</sup> *Directive 2003/87* was incorporated into the *European Economic Area [EEA] Agreement*<sup>354</sup> in October 2007 through *EEA Joint Committee Decision 146/2007*.<sup>355</sup> The *EEA Agreement* established the EEA that brings together the EU Member States and three States of the European Free Trade Association [EFTA], namely Iceland, Liechtenstein, and Norway.<sup>356</sup> The agreement further enables these three EFTA States to participate fully in the European Single Market, and provides for the inclusion of EU legislation in all policy areas of the Single Market, including the environment.<sup>357</sup> *EEA Joint Committee Decision 6/2011*<sup>358</sup> incorporated the aviation segment of the EU ETS, i.e. *Directive 2008/101*, into the *EEA Agreement*.

Since the EU ETS applies within the EEA, and not only within the EU, this thesis frequently uses the term “EEA Member States” or “EEA States” instead of “EU Member States” to denote all States that are Party to the *EEA Agreement*. For the same reason, instead of using the term “non-EU States”, this thesis frequently uses the term “non-EEA States” to refer to those States that are neither EU Member States nor the three EFTA States that are Party to the *EEA Agreement*.

In the EU, the necessity of regulating emissions from aircraft was first realized in the Sixth

---

<sup>350</sup> *Ibid.*

<sup>351</sup> See *ibid* at 32.

<sup>352</sup> See *Directive 2008/101*, *supra* note 345 at 6, 8–9. See also Md Tanveer Ahmad, “EU Emissions Trading Scheme: Problems Presented to Canada”, *European Union Centres of Excellence Newsletter* 7:1 (Winter 2012) 1 at 1, online: Carleton University <carleton.ca/euce-network-canada/wp-content/uploads/V7-1-EUCE-Newsletter-Winter2012.pdf> [Ahmad, “EU Emissions”].

<sup>353</sup> See *Directive 2008/101*, *supra* note 345 at 16.

<sup>354</sup> EC, *Agreement on the European Economic Area*, [1994] OJ, L 1/3 [*EEA Agreement*].

<sup>355</sup> EC, *Decision of the EEA Joint Committee No 146/2007 of 26 October 2007 amending Annex XX (Environment) to the EEA Agreement*, [2008] OJ, L 100/92.

<sup>356</sup> See *EEA Agreement*, *supra* note 354; European Free Trade Association, “The Basic Features of the EEA Agreement”, online: EFTA <[www.efta.int/eea/eea-agreement/eea-basic-features](http://www.efta.int/eea/eea-agreement/eea-basic-features)>.

<sup>357</sup> See *ibid.*

<sup>358</sup> EC, *Decision of the EEA Joint Committee No 6/2011 of 1 April 2011 amending Annex XX (Environment) to the EEA Agreement*, [2011] OJ, L 93/35.

Environment Action Programme of the European Community 2002–2012 [EAP], a Decision of the European Parliament and the Council of the EU, which focused on the issue of climate change and on ensuring stabilization of greenhouse gas concentration in the atmosphere.<sup>359</sup> The EAP urged the Community to initiate actions to fulfill and realize EU’s commitment of “an 8 % reduction in emissions by 2008–12 compared to 1990 levels for the European Community as a whole” under the *Kyoto Protocol*.<sup>360</sup> The EAP urged to initiate actions in the field of aviation if no such action is agreed within ICAO by 2002.<sup>361</sup> Following a review of the policy options, the European Commission adopted a Communication in September 2005 setting a strategy for reducing the climate change impact of aviation that concluded that a comprehensive approach was necessary;<sup>362</sup> the main conclusion of which was that the EU ETS should be extended to include aviation.<sup>363</sup>

The EU’s continued skepticism about ICAO’s ability to effectively address environmental issues involving aviation is evident from the reservations filed by its Member States against ICAO Assembly resolutions concerning environmental protection. The EU Member States filed reservations against Resolution A36-22,<sup>364</sup> which urged ICAO Contracting States “not to implement an emissions trading system on other Contracting States’ aircraft operators except on the basis of mutual agreement between those States”,<sup>365</sup> and against paragraph 14 of Resolution A37-19, which urged States, *inter alia*, to engage in constructive bilateral and/or multilateral consultations and negotiations with other States to reach an agreement.<sup>366</sup> While commenting on

---

<sup>359</sup> See EC, *Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme*, [2002] OJ, L 242/1 at 1 [*Decision 1600/2002*]. See also Dempsey, *supra* note 15 at 471.

<sup>360</sup> *Decision 1600/2002*, *supra* note 359 at 6.

<sup>361</sup> See *ibid* at 7.

<sup>362</sup> See EC, Commission, *Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Reducing the Climate Change Impact of Aviation*, COM(2005) 459 final (Brussels: EC, 2005), online: EUR-Lex <eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0459:FIN:EN:PDF>; European Commission, “Air: Climate Change”, online: European Commission Mobility and Transport <ec.europa.eu/transport/modes/air/environment/climate\_change\_en.htm>.

<sup>363</sup> See *ibid*.

<sup>364</sup> *Consolidated statement of continuing ICAO policies and practices related to environmental protection*, ICAO Assembly Res A36-22, 36th Sess, ICAO Doc 9902, I-54, online: ICAO <www.icao.int/publications/Documents/9902\_en.pdf>.

<sup>365</sup> *Ibid* at I-73. To view the reservation, see EC, Press Release, Memo/07/391, “Written statement of reservation on behalf of the member states of the European Community (EC) and the other states members of the European Civil Aviation (ECAC) [made at the 36th Assembly of the International Civil Aviation Organization in Montreal, 18-28 September 2007]” (2 October 2007), online: Europa <europa.eu/rapid/press-release\_MEMO-07-391\_en.htm>.

<sup>366</sup> See *ICAO Res A37-19*, *supra* note 309 at I-71. To view the entire reservation, see Belgium, *Written Statement of Reservation by Belgium on behalf of the European Union (EU), its 27 Member States, and the 17 Other States Members of the European Civil Aviation Conference (ECAC) on Resolution A37-17/2: Consolidated Statement of*

Resolution A37-19, Connie Hedegaard, the then EU's Commissioner for Climate Action, said the goal of ICAO "is not as ambitious as Europe thinks it should be".<sup>367</sup> Recently, a reservation has been filed against paragraph 16(a) of latest Resolution A38-18,<sup>368</sup> which, like Resolution A37-19, requires States to "engage in constructive bilateral and/or multilateral consultations and negotiations with other States to reach an agreement" when designing new and implementing existing market-based measures.<sup>369</sup> This skepticism is revealed in the latest Union legislation that amended the EU ETS, namely *Regulation 421/2014*.<sup>370</sup> This Regulation provides:

The Commission shall regularly, and at least once a year, inform the European Parliament and the Council of the progress of the [ICAO] negotiations as well as of its efforts to promote the international acceptance of market-based mechanisms among third countries. Following the 2016 ICAO Assembly, the Commission shall report to the European Parliament and to the Council on actions to implement an international agreement on a global market-based measure from 2020, that will reduce greenhouse gas emissions from aviation in a non-discriminatory manner, including on information, with regard to the use of revenues, submitted by Member States in accordance with Article 17 of Regulation (EU) No 525/2013.

In its report, the Commission shall consider, and, if appropriate, include proposals in reaction to, those developments on the appropriate scope for coverage of emissions from activity to and from aerodromes located in countries outside the EEA from 1 January 2017 onwards. In its report, the Commission shall also consider solutions to other issues that may arise in the application of paragraphs 1 to 4 of this Article, while preserving the equal treatment of all aircraft operators on the same route.<sup>371</sup>

The EU believes that ICAO has failed, and continues to fail, to make a satisfactory level of progress pursuant to the *Kyoto Protocol*,<sup>372</sup> and, hence, the Union has not retreated from its intention to include international civil aviation within its ETS. This reveals that the amendment to

---

*Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: European Commission <[ec.europa.eu/clima/policies/transport/aviation/docs/reservations\\_201010\\_en.pdf](http://ec.europa.eu/clima/policies/transport/aviation/docs/reservations_201010_en.pdf)>.

<sup>367</sup> Adrian Schofield & Darren Shannon, "Common Cause?", *Aviation Week & Space Technology* 172:38 (18 October 2010) 43 at 43.

<sup>368</sup> See Lithuania, *Written Statement of Reservation by Lithuania on behalf of the Member States of the European Union and 14 other Member States of the European Civil Aviation Conference (ECAC) with regard to ICAO Assembly Resolution A38-18*, at 2, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania_en.pdf)>.

<sup>369</sup> *ICAO Res A38-18*, *supra* note 238 at I-72. See also Jane Barton, "Including Aviation in the EU Emissions Trading Scheme: Prepare for Take-off" (2008) 5:2 *J Eur Envtl & Plan L* 183 at 185 (HeinOnline).

<sup>370</sup> EC, *Commission Regulation (EU) 421/2014 of the European Parliament and of the Council of 16 April 2014 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions*, [2014] OJ, L 129/1 [*Regulation 421/2014*].

<sup>371</sup> *Ibid* at 4.

<sup>372</sup> See e.g. *Directive 2008/101/EC*, *supra* note 345 at 4.

the EU ETS to include aviation is a response to ICAO's failure to achieve a satisfactory level of progress in the field of aviation environmental issues.

However, in response to intense political pressure – mainly from the non-EU economically strong States<sup>373</sup> – the European Commission, on November 12, 2012, proposed to defer the requirement for airlines to surrender emission allowances for flights into and out of Europe under the EU ETS until after the 38<sup>th</sup> ICAO Assembly meeting held in the autumn of 2013.<sup>374</sup> Consequently, this proposal to suspend was formally approved by the European Parliament and the Council of the EU.<sup>375</sup> Since the 38<sup>th</sup> Session of the ICAO Assembly, where an agreement to develop a global market-based measure for international civil aviation was reached,<sup>376</sup> the EU ETS with respect to aviation has been further amended.<sup>377</sup> According to these new amendments,<sup>378</sup> from 2013 to 2016, “only emissions from flights within the EEA fall under the EU ETS.”<sup>379</sup> Nevertheless, the EU may revert to its original ETS under *Directive 2008/101* if, at the 39<sup>th</sup> Session of the ICAO Assembly scheduled to be held in 2016, States fail to reach an agreement with respect to the application of a global market-based measure for international civil aviation from 2020.<sup>380</sup>

The EU ETS resembles one of the three market-based measures introduced in the *Kyoto Protocol*, namely emissions trading. The EU ETS works on the cap and trade principle under which

---

<sup>373</sup> See de Mestral & Ahmad, *supra* note 250 at 2; Md Tanveer Ahmad, “The CJEU’s Radical ETS Judgment: Destabilizing the Chicago Convention System” (2013) 13:1 *Issues in Aviation L & Policy* 139 at 139–40. See generally EC, Commission, *Commission Staff Working Document: Impact Assessment Accompanying the Document Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowances trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions*, SWD(2013) 430 final (Brussels: EC, 2013), online: European Commission <ec.europa.eu/clima/policies/transport/aviation/docs/swd\_2013\_430\_en.pdf>.

<sup>374</sup> See EC, News Release, “Auctions for 2012 aviation allowances put on hold” (16 November 2012), online: European Commission Climate Action <ec.europa.eu/clima/news/articles/news\_2012111601\_en.htm>; EC, News Release, “Commission proposes to ‘stop the clock’ on international aviation in the EU ETS pending 2013 ICAO General Assembly” (12 November 2012), online: European Commission Climate Action <ec.europa.eu/clima/news/articles/news\_2012111202\_en.htm>.

<sup>375</sup> See EC, *Decision 377/2013/EU of the European Parliament and of the Council of 24 April 2013 derogating temporarily from Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community*, [2013] OJ, L 113/1. See also European Commission, “Reducing emissions from aviation”, online: European Commission Climate Action <ec.europa.eu/clima/policies/transport/aviation/index\_en.htm> [European Commission, “Reducing emissions”].

<sup>376</sup> See *ICAO Res A38-18*, *supra* note 238 at I-72.

<sup>377</sup> See *Regulation 421/2014*, *supra* note 370.

<sup>378</sup> See *ibid.* To learn more about the specific changes, see EC, Commission, *Frequently Asked Questions: 2013-2016 Regulation amending the EU Emissions Trading System for aviation* (Brussels: EC, 2014), online: European Commission <ec.europa.eu/clima/policies/transport/aviation/docs/faq\_aviation\_2013-2016\_en.pdf> [EC, *FAQ: amending EU ETS*].

<sup>379</sup> See also European Commission, “Reducing emissions”, *supra* note 375.

<sup>380</sup> See *Regulation 421/2014*, *supra* note 370 at 4.

“there is a ‘cap’, or limit, on the total amount of certain greenhouse gases that can be emitted”<sup>381</sup> by different types of companies, including airline companies.<sup>382</sup> Within this cap, “companies receive emission allowances which they can sell to or buy from one another”<sup>383</sup> as required.<sup>384</sup> Limited amounts of international credits can be purchased as well.<sup>385</sup> Each company is required to surrender enough allowances to cover all of its emissions at the end of each year.<sup>386</sup> If a company reduces its emissions, it can either keep the spare allowances to cover its future needs or sell them to another company that is in need of more allowance.<sup>387</sup> Failure to surrender sufficient allowances will lead to a fine of €100 per ton of carbon emitted over the limit set by *Directive 2003/87*.<sup>388</sup> Failure to comply with these guidelines may lead to an operating ban on the respective company.<sup>389</sup>

Under the EU ETS, each airline company is administered by a single Member State for all of its aviation operations.<sup>390</sup> The total quantity of allowances to be allocated to aircraft operators is determined on the basis of the “historical” CO<sub>2</sub> emissions from the aviation sector, i.e. average of the annual emissions from years 2004, 2005 and 2006.<sup>391</sup> Originally under *Directive 2008/101*, 85 percent of emissions allowances were issued free of charge to participating airlines in 2012, which would reduce to 82 percent for the 2013 – 2020 period.<sup>392</sup> Fifteen percent of allowances were required to be auctioned off each year since 2012.<sup>393</sup> Due to the latest amendments under *Regulation 421/2014*, the number of free allowances to be issued to airlines for the 2013 – 2016 period is reduced in proportion to the decreased scope of the scheme, and the number of allowances to be auctioned for the same period reduced “in proportion to the reduction in the total number of aviation allowances to be issued.”<sup>394</sup> Although *Directive 2008/101* provides guidelines regarding

---

<sup>381</sup> European Commission, “The EU Emissions Trading System (EU ETS): Policy”, online: European Commission Climate Action <ec.europa.eu/clima/policies/ets/index\_en.htm> [European Commission, “EU ETS Policy”].

<sup>382</sup> Ahmad, “EU Emissions”, *supra* note 352 at 1.

<sup>383</sup> European Commission, “EU ETS Policy”, *supra* note 381.

<sup>384</sup> Ahmad, “EU Emissions”, *supra* note 352 at 1.

<sup>385</sup> See European Commission, “EU ETS Policy”, *supra* note 381.

<sup>386</sup> See *Directive 2008/101*, *supra* note 345 at 11–12.

<sup>387</sup> See Ahmad, “EU Emissions”, *supra* note 352 at 1.

<sup>388</sup> See *Directive 2003/87*, *supra* note 345 at 37; *Directive 2008/101*, *supra* note 345 at 13.

<sup>389</sup> See *Directive 2008/101*, *supra* note 345 at 13.

<sup>390</sup> See *ibid* at 6.

<sup>391</sup> European Commission, “Allocation of aviation allowances in an EEA-wide Emissions Trading System”, online: European Commission Climate Action <ec.europa.eu/clima/policies/transport/aviation/allowances/index\_en.htm>.

<sup>392</sup> See *Directive 2008/101*, *supra* note 345 at 8; European Commission, Press Release, Memo/11/631, “Questions & Answers on the benchmark for free allocation to airlines and on the inclusion of aviation in the EU’s Emission Trading System (EU ETS)” (26 September 2011), online: European Commission <europa.eu/rapid/press-release\_MEMO-11-631\_en.htm>.

<sup>393</sup> See *Directive 2008/101*, *supra* note 345 at 8.

<sup>394</sup> EC, *FAQ: amending EU ETS*, *supra* note 378 at 6, 7.

the use of auction proceeds, EU Member States are accorded discretion regarding the use of such revenues.<sup>395</sup>

Originally under *Directive 2008/101*, all flights by aircraft with a certified maximum takeoff mass of more than 5,700 kg arriving into, or departing from, an aerodrome in the territory of an EU Member State were included unless they satisfied any of the exemption criteria.<sup>396</sup> The following aviation activities are excluded:

- a) flights performed exclusively for the transport, on official mission, of a reigning Monarch and his immediate family, Heads of State, Heads of Government, and Government Ministers, of a State other than a Member State, where this is substantiated by an appropriate status indicator in the flight plan;
- b) military flights performed by military aircraft, and customs and police flights;
- c) flights related to search and rescue, firefighting flights, humanitarian flights, and emergency medical service flights;
- d) any flights performed exclusively under visual flight rules [VFR];
- e) flights commencing and terminating at the same aerodrome without any intermediate landing;
- f) training flights performed exclusively for the purpose of obtaining a license, or a rating in the case of cockpit flight crew provided that the flight does not serve for the transport of passengers and/or cargo or for the positioning or ferrying of the aircraft;
- g) flights performed exclusively for the purpose of scientific research or for the purpose of checking, testing or certifying aircraft or equipment;
- h) flights performed by aircraft with a certified maximum take-off mass of less than 5,700 kg;
- i) flights performed in the framework of public service obligations on routes within outermost regions, or on routes where the capacity offered does not exceed 30,000 seats per year; and
- j) flights which, but for this point, would fall within this activity, performed by a commercial air transport operator operating either:
  - fewer than 243 flights per period for three consecutive four-month periods; or

---

<sup>395</sup> See *Directive 2008/101*, *supra* note 345 at 6, 9.

<sup>396</sup> See *ibid* at 5, 17.



— flights with total annual emissions lower than 10,000 tons per year.<sup>397</sup>

In the latest amendment to the EU ETS under *Regulation 421/2014*, “[e]xemptions for operators with low emissions have...been introduced” for the 2013 – 2016 period.<sup>398</sup>

Aircraft operators performing an aviation activity listed in Annex I to *Directive 2003/87* are covered by the EU ETS irrespective of their appearance in the list of aircraft operators.<sup>399</sup> Similarly, aircraft operators that cease operating flights are excluded from the scheme once they cease to perform an aviation activity listed in Annex I and have surrendered the relevant allowances, rather than at the point when they are removed from the list.<sup>400</sup>

Will the EU ETS be successful in governing emissions from international civil aviation through the reduction of such emissions? Climate change and global warming are global issues for which global initiatives are required. The effectiveness of any unilateral measures like the EU ETS in reducing aviation emissions will be limited. It has been argued that “[e]nvironmental governance needs to be cooperative and collective because unilateral action by states is ultimately ineffective in the face of transboundary and global problems and inefficient in the face of shared or common problems.”<sup>401</sup> The scope of the EU ETS has already been diminished in response to intense political pressure, mainly from the non-EU economically powerful States. The issue of the effectiveness of the EU ETS in reducing emissions from international civil aviation that contribute to climate change and global warming is addressed in Chapter 5 of this thesis.<sup>402</sup>

### **3.3.2 Local taxes on emissions**

To reduce emissions from aviation, some European States implemented taxes on air passengers. In 1994, the United Kingdom [UK] introduced the “Air Passenger Duty” that is charged “on the carriage on a chargeable aircraft of any chargeable passenger” departing from a UK airport.<sup>403</sup> An aircraft is chargeable if it has an authorized take-off mass of more than ten tons or more than twenty seats for passengers.<sup>404</sup> The tax was not introduced “as an environmental

---

<sup>397</sup> See *ibid* at 17.

<sup>398</sup> European Commission, “Reducing emissions”, *supra* note 375.

<sup>399</sup> See European Commission, “Aircraft operators and their administering Member States”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/transport/aviation/operators/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/aviation/operators/index_en.htm)>.

<sup>400</sup> See *ibid*.

<sup>401</sup> Elliott, *supra* note 4 at 93.

<sup>402</sup> See ch 5, *below*.

<sup>403</sup> *Finance Act 1994* (UK), c 9, s 28(1). For detailed information, see *ibid*, ss 28–44.

<sup>404</sup> See *ibid*, s 29(1).

tax”,<sup>405</sup> and the UK government admitted that the tax does not have any environmental credentials and “none of the approximate £3 [billion] of annual revenues is linked to aviation investment or technological research.”<sup>406</sup> Other European States, which charge similar departure tax on air passengers, include Germany, Austria,<sup>407</sup> France, Bosnia, Serbia, Italy, and Croatia.<sup>408</sup> Among these States, Germany labels the tax as “ecological air travel levy”.<sup>409</sup> The rates of charges are:

- €7.50 per passenger for short-haul departure;
- €23.43 for medium-haul services; and
- €42.18 on long-haul flights.<sup>410</sup>

This initiative from the German government was met with severe criticism from the airline industry.<sup>411</sup> Giovanni Bisignani, the then Director General of IATA, denounced the tax as “the worst kind of short-sighted policy irresponsibility.”<sup>412</sup> According to Bisignani, the tax was “a cash-grab by a cash-strapped government”.<sup>413</sup>

According to ICAO, emissions related levies – charges and taxes – are market-based measures.<sup>414</sup> Nevertheless, the effectiveness of these taxes in governing emissions is limited due to the fact that, unlike other market-based measures, e.g., the EU ETS, taxes do not provide financial incentives to direct behavior toward environmentally responsible activity. For example, since taxes are fixed, an airline remains liable to pay the same amount of tax even if it has replaced its older aircraft with newer, more fuel-efficient aircraft to reduce aircraft engine emissions. As a

---

<sup>405</sup> Airport Watch, “Air Passenger Duty”, online: Airport Watch <[www.airportwatch.org.uk/air-passenger-duty/](http://www.airportwatch.org.uk/air-passenger-duty/)>.

<sup>406</sup> BAR UK, “Air Passenger Duty (APD)”, online: BAR UK <[www.bar-uk.org/campaigns/apd/](http://www.bar-uk.org/campaigns/apd/)>. See also A Fair Tax on Flying, “Get the Facts”, online: A Fair Tax on Flying <[www.afairtaxonflying.org/facts/](http://www.afairtaxonflying.org/facts/)>.

<sup>407</sup> Austria, *Federal Act Introducing an Air Transport Levy (Air Transport Levy Act – FlugAbgG) Federal as amended by Tax Code Amendment Act 2012*, Law Gazette BGBl I No 112/2012, online: BMF: Federal Ministry of Finance <[www.bmf.gv.at/steuern/a-z/flugabgabegesetz/Air\\_Transport\\_Levy.pdf?3vgwui](http://www.bmf.gv.at/steuern/a-z/flugabgabegesetz/Air_Transport_Levy.pdf?3vgwui)>.

<sup>408</sup> See European Business Aviation Association, “Aviation Taxes in Europe: A Snapshot” (15 January 2013), online: EBAA <[www.ebaa.org/documents/document/20140116101401-aviation\\_taxes\\_in\\_europe\\_-\\_a\\_snapshot\\_jan\\_2014.pdf](http://www.ebaa.org/documents/document/20140116101401-aviation_taxes_in_europe_-_a_snapshot_jan_2014.pdf)> [EBAA, “Aviation Taxes”].

<sup>409</sup> See “German Air Passenger Departure Tax linked to Environmental Performance draws Airline Protests”, *GREENAIRonline.com* (9 June 2010), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1128](http://www.greenaironline.com/news.php?viewStory=1128)>.

<sup>410</sup> See EBAA, “Aviation Taxes”, *supra* note 408.

<sup>411</sup> See e.g. Kurt Hofmann, “Germany implements ‘ecological’ tax on air travelers”, *ATW Plus* (10 September 2010), online: Canadian Union of Public Employees (CUPE) <[acomponent.ca/en/news/germany-implements-ecological-tax-air-travelers](http://acomponent.ca/en/news/germany-implements-ecological-tax-air-travelers)>; Geoffrey Thomas, “Airline industry blasts Germany’s ‘ecological air travel levy’”, *ATW Plus* (8 June 2010), online: ATW: Air Transport World <[atwonline.com/operations/airline-industry-blasts-germanys-ecological-air-travel-levy](http://atwonline.com/operations/airline-industry-blasts-germanys-ecological-air-travel-levy)>.

<sup>412</sup> AFP, “Global airlines slam new German departure tax”, *The Independent [UK]* (9 June 2010), online: The Independent <[www.independent.co.uk/travel/news-and-advice/global-airlines-slam-new-german-departure-tax-1995251.html](http://www.independent.co.uk/travel/news-and-advice/global-airlines-slam-new-german-departure-tax-1995251.html)>.

<sup>413</sup> *Ibid.*

<sup>414</sup> See ICAO, “Market-Based Measures”, *supra* note 300.

consequence, the unilaterally imposed tax will fail to motivate airlines to alter their behavior by adopting environment-friendly practices. Labelling a tax as a “green tax” or “ecological air travel levy” does not make it an environmental measure. The effectiveness of these unilateral taxes is briefly addressed in Chapter 6.<sup>415</sup>

### **3.3.3 Airport emissions charges**

Apart from governments, airport authorities also charge airlines for emissions. However, those charges are mainly levied to reduce local air quality pollution from aviation activities. Furthermore, most of these charges are related to emissions of NO<sub>x</sub> and/or hydrocarbons (HC) which are already regulated by Annex 16 to the *Chicago Convention*.

In Germany, the following three airports impose emissions charges: Düsseldorf Airport, Hamburg Airport, and Munich Airport. The Düsseldorf Airport authority levies an NO<sub>x</sub>-charge for landing and take-off operation.<sup>416</sup> However, in addition to NO<sub>x</sub> emissions, emissions of HC are also considered in the formula for calculating the charge.<sup>417</sup> Similarly, an emission-based charge, where emissions of both NO<sub>x</sub> and hydrocarbon are addressed, is levied per take-off and landing in both the Hamburg Airport and Munich Airport.<sup>418</sup> Three airports in the UK charge airlines for NO<sub>x</sub> emissions. The operator of the Heathrow Airport levies a NO<sub>x</sub> emission charge “on each landing by a fixed wing aircraft over 8,618kg.”<sup>419</sup> Similar emissions charge is imposed by the Gatwick Airport authority.<sup>420</sup> In the case of London Luton Airport, a NO<sub>x</sub> Levy “applies to all departing aircraft where the Engine NO<sub>x</sub> Emission exceeds 400 [grams] per passenger or per 100 [kilograms] cargo.”<sup>421</sup> In Sweden, all ten airports operated by the Swedavia AB charge airlines

---

<sup>415</sup> See ch 6, *below*.

<sup>416</sup> See Düsseldorf Airport, *Tariff Regulations for Düsseldorf Airport* (valid from 1 January 2015) at 4–5, online: Düsseldorf Airport <[www.dus.com/~media/fdg/dus\\_com/businesspartner/aviation/entgelte/tariff\\_regulations\\_2015\\_02-02-2015.pdf](http://www.dus.com/~media/fdg/dus_com/businesspartner/aviation/entgelte/tariff_regulations_2015_02-02-2015.pdf)>.

<sup>417</sup> See *ibid*.

<sup>418</sup> See Hamburg Airport, *Airport Charges: Part I* (effective 15 January 2015) at 7–8, online: Hamburg Airport <[www.hamburg-airport.de/media/Airport\\_Charges\\_Part\\_I\\_15-01-2015.pdf](http://www.hamburg-airport.de/media/Airport_Charges_Part_I_15-01-2015.pdf)>; Munich Airport, *Tariff Regulations, Part 1* (effective from 1 January 2015) at 31–32, online: Munich Airport <[www.munich-airport.de/media/download/bereiche/aviation/charges2015.pdf](http://www.munich-airport.de/media/download/bereiche/aviation/charges2015.pdf)>.

<sup>419</sup> Heathrow Airport, *Schedule 5 - Charges effective from 1 July 2014*, at para 1.2, online: Heathrow Airport <[www.heathrowairport.com/static/HeathrowAboutUs/Downloads/PDF/HAL-Conditions-of-Use-Amendment-SCHEDULE5-Up%20date-25April2014.pdf](http://www.heathrowairport.com/static/HeathrowAboutUs/Downloads/PDF/HAL-Conditions-of-Use-Amendment-SCHEDULE5-Up%20date-25April2014.pdf)>.

<sup>420</sup> See Gatwick Airport, *Gatwick Airport: Conditions of Use 2015/16* (effective from 1 April 2015) at 15, online: Gatwick Airport <[www.gatwickairport.com/globalassets/publicationfiles/business\\_and\\_community/all\\_public\\_publications/2015/2015-16-conditions-of-use---clean-30jan15.pdf](http://www.gatwickairport.com/globalassets/publicationfiles/business_and_community/all_public_publications/2015/2015-16-conditions-of-use---clean-30jan15.pdf)>.

<sup>421</sup> London Luton Airport, *Charges & Conditions of Use 2015/16* (effective from 1 April 2015) at 7.

for NO<sub>x</sub> emissions.<sup>422</sup> The emission charge applies to aircraft with a maximum take-off weight exceeding 5,700 kg.<sup>423</sup> The charge follows the standard landing and take-off cycle and is based on certified emission values of NO<sub>x</sub> in the landing and take-off cycle pursuant to Annex 16 to the *Chicago Convention*.<sup>424</sup> In Denmark, the Copenhagen Airport authority imposes an emission charge which is payable per take-off and is calculated on the basis of NO<sub>x</sub> generated from the aircraft's idealized landing and take-off cycle.<sup>425</sup>

In Switzerland, emission charges are levied at the following five airports: Basel-Mulhouse Airport, Bern Airport, Geneva International Airport, Lugano Airport, and Zurich Airport. In the case of Basel-Mulhouse Airport, the compulsory landing charge on airlines is adjusted by applying defined factors in accordance with aircraft's engine gas emission classification.<sup>426</sup> Likewise, the Bern Airport authority charges emissions surcharges on landing charges "for every approach with subsequent landing, dependent on the emissions factor of the individual aircraft engines",<sup>427</sup> the Geneva International Airport authority imposes an emission-related landing charge,<sup>428</sup> the authority of Lugano Airport applies an emission-related landing surcharge,<sup>429</sup> and the Zurich Airport authority levies emission charge that is charged per landing in accordance with the amount of NO<sub>x</sub> emissions.<sup>430</sup> It can be observed that, among these five Swiss airport authorities, only the Zurich Airport authority targets NO<sub>x</sub> emissions.

---

<sup>422</sup> These airports are: Bromma Stockholm Airport, Kiruna Airport, Göteborg Landvetter Airport, Luleå Airport, Umeå Airport, Visby Airport, Stockholm-Arlanda Airport, Malmö Airport, Åre Östersund Airport, and Ronneby Airport.

<sup>423</sup> See Swedavia, *Airport Charges: Appendix 1 to Conditions of Services* (valid from 1 April 2015), online: Swedavia <[www.swedavia.com/Global/Swedavia/Flygmarknad/Prislista\\_exceeding5700kg\\_150401.pdf](http://www.swedavia.com/Global/Swedavia/Flygmarknad/Prislista_exceeding5700kg_150401.pdf)>.

<sup>424</sup> See *ibid* at 7.

<sup>425</sup> See Copenhagen Airports, *Charges Regulations Applying to Copenhagen Airport: In Force during the Period 1 April 2015 to 31 March 2019* (1 April 2015), online: Copenhagen Airports <[www.cph.dk/en/about-cph/b2b/airline-sales/charges--slot/Copenhagen/](http://www.cph.dk/en/about-cph/b2b/airline-sales/charges--slot/Copenhagen/)>.

<sup>426</sup> See EuroAirport: Basel-Mulhouse-Freiburg, *Tariff Regulations 2015*, ER-TRA-001 V14 (valid from 1 April 2015) at 6–7, online: EuroAirport <[www.euroairport.com/en/professionals/tariff-regulations.html](http://www.euroairport.com/en/professionals/tariff-regulations.html)>. "Engines are classified in 5 different classes for gas emissions (I to V)." *Ibid* at 6.

<sup>427</sup> Bern Airport, *Schedule of Fees & Charges* (valid as of 1 July 2014) at 5, online: Flughafen Bern <[www.flughafenbern.ch/images/content/pdf/JUL14Tarifordnung\\_en\\_GB.pdf](http://www.flughafenbern.ch/images/content/pdf/JUL14Tarifordnung_en_GB.pdf)> ("[t]he same charge applies for every "touch and go" and for every "go around"). Like the Basel-Mulhouse airport, "[a]ircraft engines are assigned to five emission classes according to their emissions factor." *Ibid*.

<sup>428</sup> See Aéroport International de Genève, "Airport charges and services" (last updated 24 March 2015) at 10, online: Genève Aéroport <[www.gva.ch/en/Portaldata/1/Resources/fichiers/institutionnels/tarifs/tarifs\\_GVA\\_en.pdf](http://www.gva.ch/en/Portaldata/1/Resources/fichiers/institutionnels/tarifs/tarifs_GVA_en.pdf)>.

<sup>429</sup> See *LSZA - Lugano Airport - Aerodrome Charges: Tariff Regulations at Lugano Airport*, arts 26–29 (19 September 2013), online: Lugano Airport <[www.lugano-airport.ch/files/documents/LS\\_GEN\\_4\\_1\\_EN\\_29\\_05\\_14.pdf](http://www.lugano-airport.ch/files/documents/LS_GEN_4_1_EN_29_05_14.pdf)>.

<sup>430</sup> See Zurich Airport, "Charges", online: Zurich Airport <[www.zurich-airport.com/business-and-partners/flight-operations/charges](http://www.zurich-airport.com/business-and-partners/flight-operations/charges)>.

Since these charges are equivalent to State-imposed taxes, their impact on emissions from aviation will equally be limited. Additionally, since the main focus of those airport charges is on the local air quality pollution from aviation activities rather than on climate change and global warming, they cannot be considered as measures related to the latter environmental issues. Therefore, these charges fall beyond the scope of this thesis.

### **3.4 Conclusion**

Global climate change regime is one of the newest features of international environmental law, which itself is relatively a new area in international law. As a new entrant, the regime does not encompass all the aspects surrounding climate change and global warming and, therefore, emissions from aviation have not been appropriately addressed in the regime leaving the issue to ICAO for consideration. Since climate change and global warming are recent issues, they are not regulated by the *Chicago Convention* concluded in 1944, and ICAO has been required to take initiatives in this regard. Although the Organization has been working on these issues relentlessly, States are not content with the progress of ICAO's work as demonstrated by the adoption of unilateral measures.

At present, no multilateral binding agreement in the field of international civil aviation is in place that addresses climate change and global warming. However, several unilateral measures have been adopted to regulate emissions from aviation. Yet, a new multilateral binding agreement, an amendment to *Chicago Convention*, a new Annex to the Convention, or an amendment to Annex 16 is warranted to reduce the climate change impact of international civil aviation. The following chapters elaborately evaluate the effectiveness of the present and planned measures to govern emissions from international civil aviation. Based on the evaluation, these chapters explore possible avenues and recommend various ways to ensure effective global climate change governance in the aviation sector.

# **Chapter 4: Effectiveness of the Existing and Envisaged Global Measures to Govern Emissions from International Civil Aviation that Contribute to Climate Change and Global Warming**

## **4.1 Introduction**

This chapter addresses the environmental effectiveness of the existing and envisaged global measures to govern emissions from international civil aviation that contribute to climate change and global warming. To curb emissions from aviation, those global measures have to be effective or else the environmental footprints of aviation will exist and continue to grow. Four principal criteria for assessing environmental policy instruments for climate change mitigation are reported in the literature, namely, environmental effectiveness, cost-effectiveness, distributional considerations, and institutional feasibility.<sup>1</sup> However, among them which criteria are the most appropriate for an analysis of environmental policy cannot be determined as a result of lack of guidance from the literature in the fields of economics and political science.<sup>2</sup> Since initiatives in the field of aviation toward climate change and global warming are relatively new and, for the most part, still at their developmental stage, their effectiveness in terms of meeting environmental objectives has to be preliminarily assessed. Without environmental effectiveness, States will not find the necessary impetus to comply with and adopt those measures. Hence, this chapter focuses mainly on the environmental effectiveness of the global measures in the field of aviation. Nonetheless, the remaining criteria are considered where appropriate. For the purposes of this chapter, the term “aviation” refers to international civil aviation unless otherwise specifically

---

<sup>1</sup> See Sujata Gupta et al, “Policies, Instruments and Co-operative Arrangements” in Bert Metz et al, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 745 at 751. Gupta et al, *ibid* at 751, note:

Four principal criteria for evaluating environmental policy instruments are reported in the literature; these are:

- Environmental effectiveness – the extent to which a policy meets its intended environmental objective or realizes positive environmental outcomes.
- Cost-effectiveness – the extent to which the policy can achieve its objectives at a minimum cost to society.
- Distributional considerations – the incidence or distributional consequences of a policy, which includes dimensions such as fairness and equity, although there are others.
- Institutional feasibility – the extent to which a policy instrument is likely to be viewed as legitimate, gain acceptance, adopted and implemented.

<sup>2</sup> See *ibid*. Gupta et al, *ibid* at 751, further state that governments may apply criteria “in making ex ante choices among instruments and in ex post evaluation of the performance of instruments.”

mentioned.

The next section considers the effectiveness of the existing and envisaged legal measures in reducing emissions from international civil aviation that contribute to climate change and global warming. Thereafter, the effectiveness of ICAO's basket of mitigation measures for international civil aviation, which is under consideration by ICAO Contracting States, is evaluated. The third section focuses on market-based measures, the only economic measure in the basket, followed by three sections addressing the three technical measures in the basket, namely technology improvements, operational improvements, and sustainable alternative fuels. The fourth section deals with technology improvements, the fifth section with operational improvements, and the sixth section with alternative fuels. This chapter concludes that neither the existing and envisaged legal measures nor the mitigation measures in the basket at their present state can effectively govern emissions from international civil aviation that contribute to climate change and global warming. Binding legal measures, whether *de facto* or *de jure*, and a mandatory but temporary global market-based measure for international civil aviation are immediately required if States genuinely aspire to diminish environmental footprints of civil aviation.

## **4.2 The existing and envisaged legal measures**

### **4.2.1 Global climate change regime: UNFCCC and Kyoto Protocol**

It appears from the preceding chapter that the issue of emissions from aviation has not been appropriately addressed under the global climate change regime, which is composed of the *United Nations Framework Convention on Climate Change* [UNFCCC]<sup>3</sup> and the *Kyoto Protocol*<sup>4</sup> to the same convention.<sup>5</sup> Although emissions from aviation have been on the agenda of the UNFCCC since the first Conference of the Parties [COP],<sup>6</sup> States have failed to reach agreement on solid measures to control them.<sup>7</sup> Instead, they have been heavily concerned with “the allocation of

---

<sup>3</sup> *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, Can TS 1994 No 7 (entered into force 21 March 1994) [UNFCCC].

<sup>4</sup> *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 162 (entered into force 16 February 2005) [Kyoto Protocol].

<sup>5</sup> See ch 3, *above*.

<sup>6</sup> The Conference of the Parties is the supreme body of the UNFCCC. See UNFCCC, *supra* note 3, art 7.

<sup>7</sup> See Kati Kulovesi, “Addressing Sectoral Emissions outside the United Nations Framework Convention on Climate Change: What Roles for Multilateralism, Minilateralism and Unilateralism?” (2012) 21:3 RECIEL 193 at 196 (Academic Search Complete).

emissions from international aviation..., their reporting, and institutional and policy options to control these emissions.”<sup>8</sup> The *UNFCCC* addresses the issue, though to a limited extent, by providing that all Parties to the Convention are committed to, *inter alia*, promote and cooperate in the development, application, and diffusion of technologies, practices, and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>9</sup> in the transport sector.<sup>10</sup> Although aviation does fall within transport sector, aviation, whether domestic or international, is not explicitly mentioned, and the Convention does not define “transport”. It appears that, with regard to transport, Parties must concern themselves with technologies, practices and processes, and not with the enactment and implementation of legally binding, whether national or international, measures. The Convention does not provide any guidance regarding how to promote and cooperate in those respects and does not provide for any concrete goal that must be achieved by the aviation sector, e.g., reduction of carbon dioxide (CO<sub>2</sub>) emissions by 5 percent below 1990 levels within a certain time limit. In the absence of any guidance and any binding aim,<sup>11</sup> this commitment becomes weak and vague,<sup>12</sup> and States are left with the discretion of choosing how to meet this commitment. The application of this discretion can inevitably give rise to a number of fragmented procedures of promoting and cooperating to limit or reduce aviation emissions that heighten climate change and global warming in those three areas, namely, technologies, practices, and processes. However, since the commitment itself is weak and vague, and does not provide for any solid target that has to be achieved, how those

---

<sup>8</sup> *Ibid* [footnote omitted]. Kulovesi, *ibid* at 196–97, notes:

Various proposals have been made in the ongoing long-term negotiations to take stronger action on bunker fuels under the UNFCCC, but no significant advances have been made in this regard. In this sense, the UNFCCC and the Kyoto Protocol have not been able to create an effective legal framework for controlling emissions from international aviation... Instead, negotiations under the UNFCCC tend to focus on parties’ different views on whether the more stringent action should be taken under the UNFCCC, or whether this issue should be handled through the ICAO[.]

<sup>9</sup> *Montreal Protocol on Substances that Deplete the Ozone Layer*, 16 September 1987, 1522 UNTS 3, Can TS 1989 No 42 (entered into force 1 January 1989) [*Montreal Protocol*].

<sup>10</sup> See *UNFCCC*, *supra* note 3, art 4(1)(c).

<sup>11</sup> See Malte Petersen, “The Legality of the EU’s Stand-Alone Approach to the Climate Impact of Aviation: The Express Role Given to the ICAO by the Kyoto Protocol” (2008) 17:2 RECIEL 196 (Academic Search Complete) (“the UNFCCC neither contains mandatory limits on greenhouse gas emissions nor enforcement provisions” at 199). See also International Law Commission, *First Report on the Protection of the Atmosphere*, UNGAOR, 2014, UN Doc A/CN.4/667, at 26 [ILC, *First Report*].

<sup>12</sup> See also Patricia Birnie, Alan Boyle & Catherine Redgwell, *International Law and the Environment*, 3rd ed (New York: Oxford University Press, 2009) at 359–60; Alexandre Kiss & Dinah Shelton, *International Environmental Law*, 3rd ed (New York: Transnational, 2004) at 584–85.



procedures will be successful in curbing relevant aviation emissions is suspect.<sup>13</sup> Furthermore, areas in addition to technologies, practices, and processes (e.g., legislation) have to be covered to ensure the effectiveness of this provision under the *UNFCCC* in terms of restraining climate change and global warming.

Unlike the *UNFCCC*, the *Kyoto Protocol* sets a target for the industrialized economies that has to be achieved and uses stronger wording. Yet, the Protocol is less concerned with emissions from aviation. The *Kyoto Protocol* requires the Annex I developed States, in achieving their quantified emission limitation and reduction commitments under Article 3 of the Protocol (i.e. “reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the [first] commitment period 2008 to 2012”),<sup>14</sup> and in order to promote sustainable development, to, *inter alia*, implement and/or further elaborate policies and measures to limit and/or reduce emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>15</sup> in the transport sector in accordance with its national circumstances.<sup>16</sup> Therefore, the transportation sector is identified as one where measures related to emissions reductions can be implemented. Moreover, and most importantly, aviation is specifically mentioned in the *Kyoto Protocol*:<sup>17</sup> Article 2, paragraph 2 provides that the Annex I developed State Parties *shall* pursue limitation or reduction of emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>18</sup> from aviation bunker fuels *working through* the International Civil Aviation Organization [ICAO].<sup>19</sup> However, it appears that emissions from international aviation are kept outside the purview of the *Kyoto Protocol*, since the provision refers to “aviation”, not “international civil aviation” specifically.<sup>20</sup> Therefore, it is argued that the *Kyoto Protocol* includes emissions from domestic civil aviation requiring Annex I

---

<sup>13</sup> See e.g. Petersen, *supra* note 11 (“the provisions of the UNFCCC were not sufficient to reach the goals agreed upon in the UNFCCC” at 199).

<sup>14</sup> *Kyoto Protocol*, *supra* note 4, art 3. With respect to the second commitment period from 2013 to 2020, such commitment is raised to 8 percent below 1990 levels. See UNFCCC, “Kyoto Protocol”, online: UNFCCC <unfccc.int/kyoto\_protocol/items/2830.php>.

<sup>15</sup> *Montreal Protocol*, *supra* note 9.

<sup>16</sup> See *Kyoto Protocol*, *supra* note 4, art 2(1)(a)(vii).

<sup>17</sup> See *ibid*, art 2(2); Paul Stephen Dempsey, *Public International Air Law* (Montreal: McGill University, Institute and Center for Research in Air & Space Law, 2008) at 450.

<sup>18</sup> *Montreal Protocol*, *supra* note 9.

<sup>19</sup> See *Kyoto Protocol*, *supra* note 4, art 2(2).

<sup>20</sup> See Dempsey, *supra* note 17 at 450; UNFCCC, “Emissions from fuel used for international aviation and maritime transport (international bunker fuels)”, online: UNFCCC <unfccc.int/methods/emissions\_from\_intl\_transport/items/1057.php> (emissions from international civil aviation “are not subject to the limitation and reduction commitments of Annex I Parties under the [UNFCCC] and the Kyoto Protocol”) [UNFCCC, “Emissions from fuel used”].

developed State Parties to regulate those but excludes emissions from international civil aviation, leaving such responsibility to ICAO.<sup>21</sup> According to the guidelines of the Intergovernmental Panel on Climate Change [IPCC] and of the UNFCCC,<sup>22</sup> emissions from both national and international aviation should be calculated as part of the national greenhouse gas inventories of Parties, but emissions from international aviation “should be excluded from national totals and reported separately.”<sup>23</sup> Such exclusion has been made due to the disagreement among States on how emissions from international civil aviation can be allocated to a specific State or divided between States.<sup>24</sup>

It is apparent that the provision has been drafted ambiguously, and this ambiguity has given rise to much difficulty.<sup>25</sup> The provision does not define the phrase “working through”, leaving the question whether ICAO has been granted exclusive jurisdiction to deal with emissions from international civil aviation unanswered. Moreover, the Protocol does not provide for detailed regulation of the interaction between ICAO and Parties to the Protocol.<sup>26</sup> Other issues stem from the absence of further guidelines. For example, the provision does not define how ICAO and Parties to the Protocol will cooperate, how to deal with any conflict that arises between those regarding any proposed measure, and what would be the consequence of ICAO’s failure to come up with any meaningful measure.<sup>27</sup> Although it has been argued that the phrase “working through”

---

<sup>21</sup> See Michael Milde, “The EU Emissions Trading Scheme: Confrontation or Compromise?: A Unilateral Action Outside the Framework of ICAO” (2012) 61:2 ZLW 173 at 175 [Milde, “The EU Emissions”]; Dempsey, *supra* note 17 at 450; Jane Barton, “Including Aviation in the EU Emissions Trading Scheme: Prepare for Take-off” (2008) 5:2 J Eur Envtl & Plan L 183 at 184 (HeinOnline) [Barton, “Including Aviation”]; Matthew D Kasper, “The Air Transport Association’s Challenge to the European Union’s Extension of Its Emissions Trading Scheme to International Aviation: A Legal Analysis” (2010) 10:1 Issues in Aviation L & Policy 145 at 153–54 (HeinOnline); Jane Barton, “Tackling Aviation Emissions: the Challenges ahead” (2006) 3:4 J Eur Envtl & Plan L 316 at 317 (HeinOnline) [Barton, “Tackling”]; Daniel B Reagan, “Putting International Aviation into the European Union Emissions Trading Scheme: Can Europe Do It Flying Solo?” (2008) 35:2 BC Envtl Aff L Rev 349 at 364 (HeinOnline).

<sup>22</sup> Simon Eggleston et al, eds, *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (Hayama, Japan: Institute for Global Environmental Strategies, 2006) [Eggleston, *2006 IPCC Guidelines*].

<sup>23</sup> UNFCCC, “Emissions from fuel used”, *supra* note 20; Amit Garg et al, “Volume 2: Energy” in Eggleston, *2006 IPCC Guidelines*, *supra* note 22 at 3.57.

<sup>24</sup> See Milde, “The EU Emissions”, *supra* note 21 at 175; Barton, “Including Aviation”, *supra* note 21 at 184; Barton, “Tackling”, *supra* note 21 at 317; Dempsey, *supra* note 17 at 450. A formula has been created by the Intergovernmental Panel on Climate Change “to determine when emissions are domestic and when they are international.” Dempsey, *ibid* at 450[footnote omitted]. See also Garg et al, *supra* note 23 at 3.58–3.59.

<sup>25</sup> See also Petersen, *supra* note 11 at 202; Dempsey, *supra* note 17 at 450.

<sup>26</sup> See Petersen, *supra* note 11 at 202.

<sup>27</sup> See *ibid*.

does not confer exclusive jurisdiction to ICAO,<sup>28</sup> regard must be made to the term “shall” that makes the obligation of working through ICAO mandatory.<sup>29</sup> While proponents of the former argument are in favor of individual State action in the event of ICAO’s failure in this regard,<sup>30</sup> those who advocate the latter oppose any such unilateral initiative.<sup>31</sup>

It should be underlined that, since ICAO is not a Party to either the *UNFCCC* or the *Kyoto Protocol*, these two instruments cannot bind this international organization. Rather, the *Kyoto Protocol* binds Annex I developed State Parties (not all Parties in recognition of the principle of common but differentiated responsibilities) to pursue action for the limitation or reduction of greenhouse gas emissions from international civil aviation working through ICAO. The provision does not grant those States any authority to establish or implement, whether legal or economic, any measure to curb emissions from international civil aviation individually. Cooperation between ICAO and those developed States with regard to international civil aviation has been mandated. As mentioned earlier, at present, emissions from international civil aviation are reported under the *UNFCCC* and the *Kyoto Protocol*, but excluded from the national total emissions, and, hence, they are not counted toward Annex I Parties’ emission targets under the Protocol.<sup>32</sup> Thus, only Annex I developed State Parties have an obligation to limit or reduce emissions from their domestic civil aviation in meeting their emission targets under the Protocol.

However, in the field of aviation, the application of the principle of common but differentiated responsibilities with the current categorization of States based on their development status may be considered unfair given the fact that a significant number of developing States under the Protocol have well-developed, extremely competitive, well-capitalized, and rapidly growing

---

<sup>28</sup> See *Air Transport Association of America and others v Secretary of State for Energy and Climate Change*, C-366/10, Advocate General’s Opinion, [2011] ECR I-13765 at I-13817–I-13820 [*Opinion*]; Petersen, *supra* note 11 at 202.

<sup>29</sup> See Brian F Havel & John Q Mulligan, “The Triumph of Politics: Reflections on the Judgment of the Court of Justice of the European Union Validating the Inclusion of Non-EU Airlines in the Emissions Trading Scheme” (2012) 37:1 *Air & Space L* 3 at 25 (Kluwer Law Online).

<sup>30</sup> See *Opinion*, *supra* note 28 at I-13817–I-13820; Petersen, *supra* note 11 at 202–03.

<sup>31</sup> See Havel & Mulligan, *supra* note 29 at 24–25. Although Havel and Sanchez do not agree that ICAO has exclusive jurisdiction, they do not favor any unilateral or non-consensual agreement to reduce emissions from aircraft. Rather, they argue that “states remain free – within certain broad parameters – to work with or without the Organization to develop a consensual treaty-based approach to carbon emissions reduction.” Brian F Havel & Gabriel S Sanchez, “Toward an International Aviation Emissions Agreement” (2012) 36:2 *Harv Envtl L Rev* 351 at 358 (HeinOnline).

<sup>32</sup> See Kulovesi, *supra* note 7 at 196; UNFCCC, “Emissions from fuel used”, *supra* note 20; Garg et al, *supra* note 23 at 3.57.

airlines.<sup>33</sup> Even though the legal status of this principle is not entirely clear and is often regarded as one of the emerging principles,<sup>34</sup> if this principle is chosen to be applied in aviation, it should apply with a new classification of developed and developing States for the purposes of aviation.<sup>35</sup> This is more crucial for international civil aviation than domestic civil aviation since, without this new classification, the main purpose of this principle will be defeated.

The main purpose of the principle of common but differentiated responsibilities is differentiating “between developed and developing nations in determining the degree of responsibility that a nation has in addressing and remedying the [greenhouse gas] problem.”<sup>36</sup> Ultimately, the purpose is to attribute more responsibility to developed States than to developing ones due to developed States’ larger contribution to the creation of the greenhouse gas problem, and their current ability to prevent, reduce, and control the threat.<sup>37</sup> Excluding some of today’s largest polluters from climate change related obligation would be in contradiction with the objective of the *UNFCCC*, and inconsistent with the undisputed customary principle of

---

<sup>33</sup> See also Dempsey, *supra* note 17 at 479–80; Armand de Mestral & Md Tanveer Ahmad, “A Pre-Analysis of Canada–EU Aviation Relations post-ICAO Assembly Meeting Concerning Emissions Trading System”, Policy Brief, Carleton University Canada–Europe Transatlantic Dialogue (April 2013) at 2, online: Carleton University <labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2013-04-brief-demestral-ahmad-mcgill-aviation-emissions.pdf>.

<sup>34</sup> See Dinah Shelton, “Equity” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 639 at 657. For a concise but good discussion on the principles, see Ian Brownlie, *Principles of Public International Law*, 7th ed (New York: Oxford University Press, 2008) at 275–80. Concerning the principle, Beyerlin states:

The idea of ‘common but differentiated responsibilities’ has left several marks in the modern treaty practice of states. In particular, it is mirrored in the asymmetric obligation schemes of the Montreal Protocol on Substances That Deplete the Ozone Layer and the Kyoto Protocol to the UN Framework Convention on Climate Change. However, whether this principle has been accepted in the ‘general practice’ of states is uncertain as states’ attitudes to this principle appear to be rather ambivalent as yet. Thus, it can hardly claim to be part of today’s customary international law.

Ulrich Beyerlin, “Different Types of Norms in International Environmental Law: Policies, Principles, and Rules” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 425 at 442. In contrast, Birnie, Boyle & Redgwell, *supra* note 12 at 28, argue that these principles “may lack the supposedly harder edge of a ‘rule’ or ‘obligation’, but they should not be confused with ‘non-binding’ or emerging law.”

<sup>35</sup> See de Mestral & Ahmad, *supra* note 33 at 6.

<sup>36</sup> Michael Weisslitz, “Rethinking the Equitable Principle of Common but Differentiated Responsibility: Differential Versus Absolute Norms of Compliance and Contribution in the Global Climate Change Context” (2002) 13:2 *Colo J Intl Envtl L & Pol’y* 473 at 476 (HeinOnline).

<sup>37</sup> See Philippe Sands et al, *Principles of International Environmental Law*, 3rd ed (New York: Cambridge University Press, 2012) at 233; Birnie, Boyle & Redgwell, *supra* note 12 at 132–33. See also Weisslitz, *supra* note 36 at 476; Rowena Maguire, “Incorporating International Environmental Legal Principles into Future Climate Change Instruments” (2012) 6:2 *Carbon & Climate L Rev* 101 at 109 (Academic Search Complete); Paul G Harris, “Common But Differentiated Responsibility: The Kyoto Protocol and United States Policy” (1999) 7:1 *NYU Envtl LJ* 27 at 28, 30 (HeinOnline).

international law according to which States have a sovereign right to exploit their own resources and simultaneous responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.<sup>38</sup> It is, therefore, argued that a more accurate and equitable implementation of the principle of common but differentiated responsibilities takes into account “not only the historical blame of developed States but also the current contributions to global environmental degradation.”<sup>39</sup> Although, both domestically and internationally, developing States, e.g., China, the United Arab Emirates [UAE], Brazil, and Singapore, with a healthy aviation industry will get license to enlarge their industry without restriction, such growth will deny airlines of developed States under the Protocol a level playing field to effectively compete in the international civil aviation market with the airlines of those developing States. In such circumstances, the existing developed States will fail to find the required impetus to participate in any measures toward reducing emissions from aviation. The growth of the aviation industry of developing States coupled with the reluctance of developed States to participate in emissions restriction measures will result in more unrestricted emissions. Ultimately, embracing the principle of common but differentiated responsibilities in aviation with the current categorization of States will fail to restrict emissions from aviation that contribute to climate change and global warming. One must note that two economically developed States with an established and large aviation industry, namely the United States [US] and Canada, are not parties to the Protocol and, hence, do not incur any responsibility to reduce emissions from aviation under the Protocol thereby further weakening its effectiveness.<sup>40</sup> The principle of common but differentiated responsibilities is further addressed in a subsequent section dealing with market-based measures.<sup>41</sup>

It appears that the *Kyoto Protocol* does not provide an effective mechanism to address emissions from aviation. Therefore, it can be submitted that the global climate change regime does

---

<sup>38</sup> See Michel Adam, “ICAO Assembly’s Resolution on Climate Change: A ‘Historic’ Agreement?” (2011) 36:1 Air & Space L 23 at 28 (Kluwer Law Online). See also David M Ong, “International Legal Efforts to Address Human-induced Global Climate Change” in Malgosia Fitzmaurice, David M Ong & Panos Merkouris, eds, *Research Handbook on International Environmental Law* (Cheltenham, UK: Edward Elgar, 2010) 450 (“[w]ithin international environmental law, apart from a specific breach of the Climate Change Convention regime, States are subject to the universal notion of State responsibility for transboundary environmental harm (*Trail Smelter Arbitration*, 1941)” at 452 [emphasis in original]).

<sup>39</sup> Adam, *supra* note 38 at 28.

<sup>40</sup> See e.g. de Mestral & Ahmad, *supra* note 33 at 6.

<sup>41</sup> See section 4.3, *below*.

not sufficiently guard against emissions from international civil aviation that contribute to climate change and global warming.

#### **4.2.2 Global legal measures in the field of aviation: Chicago Convention and International Civil Aviation Organization**

In international civil aviation, due to ICAO's clear mandate and tacit responsibility to reduce emissions from aviation under the *Kyoto Protocol* and the *Chicago Convention*,<sup>42</sup> respectively, and in the absence of any explicit provision on environmental matters in the *Chicago Convention*, as noted in the previous chapter,<sup>43</sup> the effectiveness of the existing and proposed legal measures of ICAO to govern aviation emissions that exacerbate climate change and global warming need to be assessed.

As noted in the foregoing Chapter,<sup>44</sup> since no explicit provisions on the protection of the environment were incorporated in the *Chicago Convention*, ICAO has used its authority under the Convention to adopt international standards and recommended practices [SARPs] as Annexes to the Convention by adopting Annex 16 to address environmental issues.<sup>45</sup> It has been observed that Annex 16, Volume II, which addresses the issue of aircraft engine emissions, does not sufficiently address climate change and global warming: it is not mandatory like the provisions of the *Chicago Convention*; it can be, and has been, opted out by States, including the US, if they find it impracticable to comply; and it does not address two major greenhouse gases,<sup>46</sup> namely, carbon dioxide (CO<sub>2</sub>) and water vapor (H<sub>2</sub>O), emitted by aircraft engines.<sup>47</sup> Furthermore, the fact that Volume II is concerned only with aircraft engine emissions, not with the entire aircraft design of which engine is only part, further limits the effectiveness of this provision in controlling aircraft emissions.<sup>48</sup> Although addressing engines is significant in terms of fuel efficiency, "it is not

---

<sup>42</sup> See *Kyoto Protocol*, *supra* note 4, art 2(2); *Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295, Can TS 1944 No 36, ICAO Doc 7300/9, art 44 [*Chicago Convention*].

<sup>43</sup> See ch 3, *above*.

<sup>44</sup> See *ibid*.

<sup>45</sup> See *Chicago Convention*, *supra* note 42, arts 37, 54(1), 90.

<sup>46</sup> For the emissions certification for all types of engines, the following emissions shall be controlled: smoke and three gases, namely, unburned hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO<sub>x</sub>). See ICAO, (2008) 3 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 2, Aircraft Engine Emissions, at III-2-1, III-3-1 [*Annex 16: Volume 2*].

<sup>47</sup> See also Havel & Sanchez, *supra* note 31 at 358.

<sup>48</sup> See Jin Liu, "The Role of ICAO in Regulating the Greenhouse Gas Emissions of Aircraft" (2011) 5:4 Carbon & Climate L Rev 417 at 421 (Academic Search Complete).

sufficient to determine how clean the aircraft is in terms of controlling emissions. For example, the weight of an aircraft also matters for its emissions level.”<sup>49</sup> Although, it is argued, “[t]he certification of the aircraft as a whole rather than only its engine would appear to make more sense from an environmental perspective,” concerns have been raised that “this would raise considerable difficulties as to the choice of the parameters on the basis of which the certification could be issued.”<sup>50</sup> Moreover, “a very wide variety of engine-airframe permutations would have to be certified, taking into account operational factors of all kinds.”<sup>51</sup> In such a circumstance, “the present system of certifying aircraft engines in relation to emissions seems reasonable”.<sup>52</sup> Nevertheless, it is “unable to control aviation emissions effectively.”<sup>53</sup>

A new volume, namely Volume III, will be added to Annex 16 that will provide for new CO<sub>2</sub> aircraft standards.<sup>54</sup> Volume III is under development,<sup>55</sup> and, hopefully, will overhaul one of the flaws of Annex 16, i.e. its failure to address aircraft CO<sub>2</sub> emissions in Volume II. Like Volume II, if Volume III deals only with engines, it will nevertheless suffer from the same weakness that Volume II suffers for failing to consider the entire aircraft in the certification process. It should be emphasized that certification, whether of the engine or the entire aircraft, alone cannot control emissions; other economic and technical methods, e.g., market-based measures and improved operational procedures, have to be considered. Again, since Annexes are *de jure* “soft law”,<sup>56</sup> States may readily avoid complying with Volume III as they did with regard to Volume II unless it serves their interest.

Volume III may achieve *de facto* “hard law” status at least, if economically powerful States, e.g., the US and the European Union [EU] Member States, comply with the new CO<sub>2</sub> standard and utilize their authority under Article 33 of the *Chicago Convention* by refusing aircraft from non-compliant States to their territory for failing to meet minimum standards established

---

<sup>49</sup> *Ibid* [footnote omitted].

<sup>50</sup> *Ibid* [footnote omitted].

<sup>51</sup> *Ibid*.

<sup>52</sup> *Ibid*.

<sup>53</sup> *Ibid*.

<sup>54</sup> See ICAO, “Committee on Aviation Environmental Protection (CAEP)”, online: ICAO <[www.icao.int/environmental-protection/Pages/Caep.aspx](http://www.icao.int/environmental-protection/Pages/Caep.aspx)>; Jane Hupe, “Aviation and Environment: Developments Since the Last Assembly” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished].

<sup>55</sup> See *ibid*.

<sup>56</sup> See Dempsey, *supra* note *supra* note 17 at 75–80.

under the Convention.<sup>57</sup> In any case, as argued in the previous chapter, Annexes should be made *de jure* “hard law” to ensure more effectiveness.<sup>58</sup> This requires amending the *Chicago Convention*, a difficult and time-consuming process.<sup>59</sup>

The ICAO Assembly is vested with the authority to consider proposals for the modification or amendment of the provisions of this convention and, if it approves the proposals, to recommend them to the Contracting States.<sup>60</sup> Such an initiative involves prior consultation with key States and gathering political will of the Contracting States to secure a high number of ratifications,<sup>61</sup> i.e. not less than two-thirds of the Contracting States.<sup>62</sup> Therefore, either adopting a new Annex or amending Annex 16, in order to ensure effectiveness of these SARPs under Annex 16 with respect to aviation’s impacts on climate change and global warming, may be easier, faster, and a more flexible process than amending the Convention or drafting a new treaty.<sup>63</sup> Although ICAO is not explicitly granted any authority by the *Chicago Convention* to promote the enactment of new conventions, precedents exist in the fields of aviation security and liability “where several multilateral conventions were drafted under the auspices of ICAO.”<sup>64</sup> Whether it is the adoption of a new Annex, an amendment to Annex 16 to the Convention, an amendment to the Convention, or drafting of a new treaty, in every case, consensus among States on the issue of governing emissions from aviation that contribute to climate change and global warming irrespective of their economically development status is required.<sup>65</sup>

It has been mentioned in the earlier chapter that, apart from Annex 16, Volume II, ICAO adopted several other legal measures to fill in the gaps left by the *Chicago Convention* and its

---

<sup>57</sup> See *Chicago Convention*, *supra* note 42, art 33.

<sup>58</sup> See ch 3, *above*.

<sup>59</sup> See also Liu, *supra* note 48 at 422.

<sup>60</sup> See *Chicago Convention*, *supra* note 42, art 49(j).

<sup>61</sup> See also Gilbert Guillaume, “ICAO at the Beginning of the 21<sup>st</sup> Century: The 8<sup>th</sup> Beaumont Memorial Lecture, 5 February 2008” (2008) 33:4/5 *Air & Space L* 313 at 317 (Kluwer Law Online); Liu, *supra* note 48 at 422.

<sup>62</sup> See *Chicago Convention*, *supra* note 42, art 94(a).

<sup>63</sup> See Liu, *supra* note 48 at 425.

<sup>64</sup> de Mestral & Ahmad, *supra* note 33 at 9 [footnote omitted]. See Dempsey, *supra* note 17 at 233; Havel & Sanchez, *supra* note 31 (the authors “propose that a sectoralized treaty to reduce the emissions produced by international civil aviation is both feasible and normatively desirable” at 353). Havel & Sanchez, *ibid* at 360, argue that, “[p]resumably, so long as the Protocol’s parties do not venture beyond [ICAO’s] mandates as listed in the Chicago Convention and expressed through Assembly Resolutions, there would be no conflict if two states, certain clusters of states, or even all of the ICAO member states were to negotiate an emissions reduction treaty outside the Organization’s auspices.”

<sup>65</sup> This issue is further discussed in Chapter 6, *below*.



Annexes.<sup>66</sup> These include: Assembly Resolutions A38-18 and A37-19,<sup>67</sup> the Declaration and Recommendations of High-level Meeting on International Aviation and Climate Change,<sup>68</sup> and Programme of Action on International Aviation and Climate Change.<sup>69</sup> Nonetheless, none of these measures has any legally binding effect since these are considered “soft law”.<sup>70</sup> Resolutions, declarations or programs of action are non-binding soft law, and are not law *per se*;<sup>71</sup> these instruments are a type of social or moral rather than legal norms.<sup>72</sup> Hence, due to their non-binding nature, it is likely that these measures will not succeed, as argued in the previous chapter,<sup>73</sup> in effectively governing emissions from aviation.

Therefore, from the foregoing, it can be submitted that, at present, no global legal measures in the field of aviation is in effect that can effectively restrict and reduce emissions from international civil aviation that contribute to the escalation of climate change and global warming. Since international civil aviation is global in nature, and climate change and global warming are global problems, a global solution to reducing emissions from aviation is imperative. Hence, any binding measure in the field of aviation must be a global solution that comes from ICAO.

---

<sup>66</sup> See ch 3, *above*.

<sup>67</sup> *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A38-18, 38th Sess, ICAO Doc 10022, I-68, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)> [*ICAO Res A38-18*]; *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A37-19, 37th Sess, ICAO Doc 9958, I-67, online: ICAO <[www.icao.int/publications/Documents/9958\\_en.pdf](http://www.icao.int/publications/Documents/9958_en.pdf)> [*ICAO Res A37-19*].

<sup>68</sup> *Declaration by the High-level Meeting on International Aviation and Climate Change (HLM-ENV/09) in October 2009*, in ICAO, “Climate Change: Programme of Action”, online: ICAO <[www.icao.int/environmental-protection/Pages/programme-of-action.aspx](http://www.icao.int/environmental-protection/Pages/programme-of-action.aspx)>.

<sup>69</sup> ICAO Secretariat, “ICAO Programme of Action on International Aviation and Climate Change” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 8 at 9.

<sup>70</sup> See e.g. Alan Boyle, “Soft Law in International Law Making” in Malcolm D Evans, ed, *International Law*, 2nd ed (Oxford: Oxford University Press, 2006) 141 at 141–43; Alina Kaczorowska, *Public International Law*, 4th ed (Oxford: Routledge, 2010) at 64–65; Dinah Shelton, “Soft Law” in David Armstrong, ed, *Routledge Handbook of International Law* (Oxford: Routledge, 2009) 68 at 68–71 [Shelton, “Soft”].

<sup>71</sup> See e.g. Shelton, “Soft”, *supra* note 70 at 68–71; Boyle, *supra* note 70 at 141–43; Michael Milde, *International Air Law and ICAO* in Marietta Benkö, ed, *Essential Air and Space Law*, vol 4 (Utrecht: Eleven International Publishing, 2008) at 169 [Milde, *International*]; Mark Weston Janis, *International Law*, 6th ed (New York: Wolters Kluwer Law & Business, 2012) at 55.

<sup>72</sup> See Shelton, “Soft”, *supra* note 70 at 69.

<sup>73</sup> See ch 3, *above*.

### **4.3 Market-based measures in international civil aviation\***

#### **4.3.1 The current state of market-based measures in aviation**

The only economic measure in ICAO's basket of measures to address emissions from international civil aviation is market-based measures.<sup>74</sup> Other mitigation measures in the basket include aircraft technology improvements, operational improvements, and sustainable alternative fuels, all of which are technical measures.<sup>75</sup> This section concentrates on market-based measures, which is currently the most important of all mitigation measures in the basket.

No global market-based measure for international civil aviation is in place now, though ICAO has been relentlessly working on such measures for the last decade. A number of studies have been undertaken by ICAO since 2001 that resulted in the preparation of guidance material on these measures.<sup>76</sup> Due to Assembly Resolution A37-19 adopted in 2010,<sup>77</sup> market-based measures "became a part of a basket of measures that States can use to address CO<sub>2</sub> emissions from international [civil] aviation".<sup>78</sup> According to Resolutions A37-19 and A38-18, ICAO Contracting States are encouraged to submit their action plans that "should include information on the basket of measures considered by States".<sup>79</sup> At its 37<sup>th</sup> Session in 2010, the ICAO Assembly requested the Council to perform further work in the area of market-based measures.<sup>80</sup>

In early 2012, six potential options for a global market-based measure were identified and, in June 2012, the ICAO Council narrowed these options to three, namely, global mandatory

---

\* Section 4.3 includes excerpts from the author's following article: "Environmental Effectiveness of ICAO's Basket of Mitigation Measures to Arrest Emissions from International Civil Aviation" (2014) 39 Ann Air & Sp L 75.

<sup>74</sup> See ICAO Secretariat, "Overview – Market-Based Measures: Market-Based Measures" in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 138 at 138 [ICAO Secretariat, "Overview – Market"]; Jane Hupe, "Towards Environmental Sustainability" in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 11 at 11 [Hupe, "Towards"].

<sup>75</sup> See Hupe, "Towards", *supra* note 74 at 11; ICAO Secretariat, "Overview: Global Emissions" in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 96 [ICAO Secretariat, "Overview: Global"].

<sup>76</sup> ICAO, *Report of the Assessment of Market-based Measures*, 1st ed, ICAO Doc 10018 (2013) at (vii), online: ICAO <[www.icao.int/Meetings/a38/Documents/10018\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/10018_en.pdf)> [*Report on Market-based Measures*].

<sup>77</sup> *ICAO Res A37-19*, *supra* note 67.

<sup>78</sup> *Report on Market-based Measures*, *supra* note 76 at (vii).

<sup>79</sup> *ICAO Res A37-19*, *supra* note 67 at I-70; *ICAO Res A38-18*, *supra* note 67 at I-71–I-72.

<sup>80</sup> See *ICAO Res A37-19*, *supra* note 67 at I-71; *Report on Market-based Measures*, *supra* note 76 at (vii).

offsetting,<sup>81</sup> global mandatory offsetting with revenue,<sup>82</sup> and global emissions trading.<sup>83</sup> Further quantitative and qualitative assessment of these options was requested and performed accordingly.<sup>84</sup> At the 38<sup>th</sup> Session of the ICAO Assembly, an agreement to develop a global market-based measure was reached.<sup>85</sup> According to paragraph 19 of Assembly Resolution A38-18,<sup>86</sup> the Assembly requested the ICAO Council, with the support of Contracting States, to:

- “finalize the work on the technical aspects, environmental and economic impacts and modalities of the *possible options* for a global”<sup>87</sup> market-based measure;
- “organize seminars, workshops on a global scheme”<sup>88</sup> for international civil aviation;
- “identify the major issues and problems...and make a recommendation on” a global market-based measure which appropriately addresses these issues and problems and key design elements, and the mechanisms for the implementation of the measure “from 2020

---

<sup>81</sup> Under this measure, “participants acquire emissions units to offset emissions from international aviation above an agreed baseline”. ICAO Council, *Market-Based Measures (MBMs)*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 29, Doc A38-WP/29/Ex/24 (4 September 2013) at 2, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp029\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp029_en.pdf)> [ICAO Council, *Market-Based*].

<sup>82</sup> This measure “would generally function the same way as the mandatory offsetting scheme. A key difference would be that in addition to offsetting, revenue would be generated by applying a fee to each tonne of carbon, for instance, through a transaction fee. The revenue would be used for agreed purposes, such as climate change mitigation or providing support to developing States to reduce” greenhouse gas emissions. *Ibid.*

<sup>83</sup> Under this measure, total international civil aviation “emissions are capped at an agreed level for a specified compliance period.” Aviation allowances, where one allowance is equivalent to one ton of CO<sub>2</sub>, “would be created for all the emissions under the cap. These allowances would then be distributed among, or auctioned to, participants, using an agreed method.” At the end of each compliance period, participants would be required to “surrender sufficient aviation allowances, or other emissions units, such as offsets from other sectors, to cover all the emissions generated during that period.” Moreover, “[r]evenues can be generated by auctioning aviation allowances.” *Ibid.* See also *Report on Market-based Measures*, *supra* note 76 at (vii); ICAO Secretariat, “Overview – Market”, *supra* note 74 at 139.

<sup>84</sup> See *Report on Market-based Measures*, *supra* note 76 at (vii); ICAO Secretariat, “Overview – Market”, *supra* note 74 at 139.

<sup>85</sup> See *ICAO Res A38-18*, *supra* note 67 at I-72; ICAO, Press Release, “Dramatic MBM Agreement and Solid Global Plan Endorsements Help Deliver Landmark ICAO 38th Assembly” (4 October 2013), online: ICAO <[www.icao.int/Newsroom/Pages/mbm-agreement-solid-global-plan-endorsements.aspx](http://www.icao.int/Newsroom/Pages/mbm-agreement-solid-global-plan-endorsements.aspx)>.

<sup>86</sup> *ICAO Res A38-18*, *supra* note 67 at I-72–I-73. The Resolution has already received a significant number of reservations. See ICAO, “Reservations to Resolution A38-18 (17/2)”, online: ICAO <[www.icao.int/Meetings/a38/Pages/resolutions.aspx](http://www.icao.int/Meetings/a38/Pages/resolutions.aspx)> [ICAO, “Reservations Res A38-18”].

<sup>87</sup> *ICAO Res A38-18*, *supra* note 67 at I-72 [emphasis added]. It is worth noting that the Resolution does not say three options but possible options. The Russian Federation proposed replacing the word “three” with “possible” and it was replaced accordingly. See Russian Federation, *Proposed Improvements for the Draft Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection - Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 275, Doc A38-WP/275/Ex/94 (10 September 2013) at 3, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp275\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp275_en.pdf)> [Russian Federation, *Proposed Improvements*].

<sup>88</sup> *ICAO Res A38-18*, *supra* note 67 at I-72.

as part of a basket of measures...to achieve ICAO's global aspirational goals";<sup>89</sup> and

- report the results of all these works for decision by the next session, i.e. 39<sup>th</sup> Session, of the Assembly scheduled to be held in 2016.<sup>90</sup>

Therefore, it is now certain that no global market-based measure for international civil aviation will come into effect before 2020.

#### **4.3.2 The necessity of a global market-based measure for international civil aviation**

At a time when the IPCC has concluded that the “[w]arming of the climate system is unequivocal” and the processes of climate change and global warming are continuing at a much higher speed than before thereby threatening the existence of all living beings on Earth,<sup>91</sup> delay in implementing a global market-based measure for international civil aviation is reprehensible. Emissions from international civil aviation that contribute to climate change and global warming will continue to grow during this period, thus aggravating the already unsustainable situation.<sup>92</sup> The fact that implementation of any market-based measure scheme is made subject to the decision by the next session of the Assembly, which is scheduled to take place in 2016, will further delay the entire process. Any negative decision by the Assembly will either delay the implementation of or disapprove any market-based measure for international civil aviation. More delay in the development and implementation or the absence of any global market-based measure for international civil aviation will make it very difficult, if not impossible, for the aviation sector to contribute to combating climate change and global warming.<sup>93</sup> No one sector can effectively

---

<sup>89</sup> *Ibid.*

<sup>90</sup> *Ibid* at I-73.

<sup>91</sup> IPCC, “Summary for Policymakers” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 3 at 4: “Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased”.

<sup>92</sup> See e.g. Lithuania, *Written Statement of Reservation by Lithuania on behalf of the Member States of the European Union and 14 other Member States of the European Civil Aviation Conference (ECAC) with regard to ICAO Assembly Resolution A38-18*, online: ICAO

<[www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania_en.pdf)> (“[b]y 2020, global international aviation emissions are projected to be around 70% higher than 2005 levels, even with the 2% per year fuel efficiency improvement foreseen in the Resolution” at 1) [Lithuania, *Written Statement*].

<sup>93</sup> The International Coalition for Sustainable Aviation opines that “the real climate benefit of any action depends on the cumulative emission reductions between now and a future date, and not just on achieving a certain amount of emission reductions by a specific year. Early reductions result in a lower emissions trajectory than equivalent annual

combat climate change and global warming alone; collective and simultaneous action from all sectors is required. Failure in one sector to effectively combat climate change and global warming will pass on a heavy burden on other sectors to combat these and may frustrate mitigating measures.

It is true that no market-based measure can provide any long-term, permanent solution to the problem of emissions. As economic measures, market-based measures can only create pressure on the industry to adopt various initiatives, mainly technical measures, to decrease their environmental footprint. Thus, these measures can only restrict or reduce emissions to a certain level. Only proven technology and policy implementation that guarantees zero emissions or, at least, zero growth in emissions can provide a permanent solution to the issues of climate change and global warming. However, technological improvement, which is a very expensive and time-consuming process, has yet to attain that objective.<sup>94</sup> The other two technical measures in the basket, namely operational improvements and sustainable alternative fuels, cannot provide near-term solution at this stage: operational improvements cannot reduce emissions to the extent necessary to significantly diminish aviation's contribution to climate change and global warming, and the use of alternative fuels has not become commercially viable yet.<sup>95</sup> Therefore, market-based measures are considered "to be an important gap filler"<sup>96</sup> to complement technology, operational, and infrastructure measures.<sup>97</sup> It is now well understood that, without effective global market-

---

savings made at a later date." International Coalition for Sustainable Aviation, *Effective Market-Based Measures to Address Greenhouse Gas Emissions from International Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 288, Doc A38-WP/288/Ex/100 (12 September 2013) at 2, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp288\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp288_en.pdf)> [ICSA, *Effective*].

<sup>94</sup> The issue of technology improvement is addressed in section 4.4, *below*.

<sup>95</sup> The issues of operational improvement and sustainable alternative fuels are addressed in sections 4.5 and 4.6, respectively, *below*. According to the IPCC fourth assessment report, "[m]edium term mitigation potential for CO<sub>2</sub> emissions from the aviation sector can come from improved fuel efficiency, which can be achieved through a variety of means, including technology, operations and air traffic management. However, such improvements are expected to only partially offset the growth of aviation emissions." IPCC, "Summary for Policymakers" in Bert Metz et al, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 1 at 13 [IPCC, "Summary: Mitigation 2007"].

<sup>96</sup> ICAO Secretariat, "Overview - Market", *supra* note 74 at 138. See also ICSA, *Effective*, *supra* note 93; Airports Council International et al, *Addressing CO<sub>2</sub> Emissions from Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 68, Doc A38-WP/68/Revision no 3/Ex/33 (17 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp068\\_rev3\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp068_rev3_en.pdf)>.

<sup>97</sup> See International Air Transport Association, Press Release, 34, "Historic Agreement on Carbon-Neutral Growth" (3 June 2013), online: IATA <[www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx](http://www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx)> [IATA, "Historic Agreement"]; ICSA, *Effective*, *supra* note 93; Paul Steele, "Aviation – Benefits Beyond Borders – ICAO Destination Green" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination

based measures, ICAO's goal of achieving carbon neutral growth from 2020 will remain a dream.<sup>98</sup> The forecasts by ICAO's Committee on Aviation Environmental Protection [CAEP] show that, even after the implementation of technology and operational improvements and assuming 3 percent use of alternative fuels, "the emissions gap from carbon neutral growth in 2020 would be on the order of 500 Mt by 2040" (see Figure 1 below).<sup>99</sup> Hence, ICAO argues that market-based measures are essential "to fill this emissions gap, together with sustainable alternative fuels."<sup>100</sup> Therefore, delaying in developing and implementing a global market-based measure for international civil aviation is unacceptable. Robust action on the part of ICAO and, especially, its Contracting States is warranted in this respect.

---

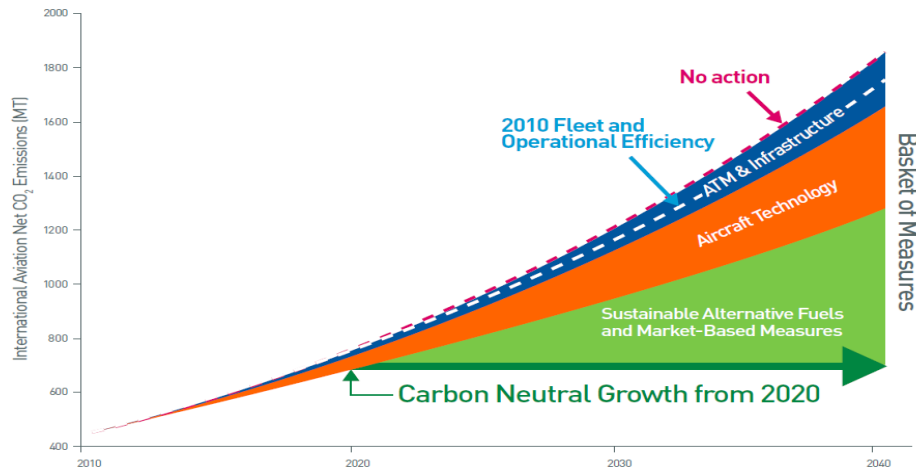
Green", Montreal, 14 – 16 May 2013) [unpublished]; Annie Petsonk, "A Global MBM for Aviation and Climate Change: The Time is Now!" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination Green", Montreal, 14 – 16 May 2013) [unpublished] ("[s]trong economic rationale for [market-based measures] given practical limits to technology improvements or accelerated fleet replacement (high abatement costs relative to other sectors)").

<sup>98</sup> See ICAO Secretariat, "Overview – Market", *supra* note 74 at 138; Sam Brand, "An Introduction to Market-based Measures" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination Green", Montreal, 14 – 16 May 2013) [unpublished]; Andreas Hardeman, "Reframing Aviation Climate Politics and Policies" (2011) 36 *Ann Air & Sp L* 1 at 16; Petsonk, *supra* note 97; Steele, *supra* note 97; ICAO, *Environment: Market-based Measures and Climate Change* (August 2013), online: ICAO <[cfapp.icao.int/tools/38thAssyikit/story\\_content/external\\_files/Flyer\\_US-Letter\\_ENV\\_MBMs\\_2013-08-30.pdf](http://cfapp.icao.int/tools/38thAssyikit/story_content/external_files/Flyer_US-Letter_ENV_MBMs_2013-08-30.pdf)> [ICAO, *Environment: Market-based*]; DS Lee, LL Lim & B Owen, "Mitigating future aviation CO<sub>2</sub> emissions – "timing is everything"" (27 August 2013) at 2, online: Manchester Metropolitan University Dalton Research Institute <[www.cate.mmu.ac.uk/docs/mitigating-future-aviation-co2-emissions.pdf](http://www.cate.mmu.ac.uk/docs/mitigating-future-aviation-co2-emissions.pdf)>. However, the Russian Federation does not believe the same as apparent from the working paper submitted during the 38<sup>th</sup> Session of the ICAO Assembly and from the reservation to Assembly Resolution A38-18. See Russian Federation, *Market-Based Measures as the Factor of an Increase of Greenhouse Gas Emissions in the Sector of International Civil Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 250, Doc A38-WP/250/Ex/83 (20 August 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp250\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp250_en.pdf)> [Russian Federation, *Market-Based*]; Russian Federation, *Statement from the Delegation of the Russian Federation: Re: Report on Agenda Item 17 for the 38th ICAO Assembly (Climate Change section)*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Russia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Russia_en.pdf)> [Russian Federation, *Statement*].

<sup>99</sup> ICAO, *Environment: Market-based*, *supra* note 98.

<sup>100</sup> *Ibid.*

**Figure 1: Contribution of Measures for Reducing International Civil Aviation Net CO<sub>2</sub> Emissions**



Source: ICAO, *Environment: Market-based Measures and Climate Change* (August 2013), online: ICAO <[cfapp.icao.int/tools/38thAssyikit/story\\_content/external\\_files/Flyer\\_US-Letter\\_ENV\\_MBM\\_s\\_2013-08-30.pdf](http://cfapp.icao.int/tools/38thAssyikit/story_content/external_files/Flyer_US-Letter_ENV_MBM_s_2013-08-30.pdf)>.

### **4.3.3 The impact of a global market-based measure for international civil aviation**

Market-based measures offer the most cost-effective way of and near-term solution to addressing climate change and global warming from the aviation sector. These measures “are intended to support the lowest possible cost to reduce emissions” in all sectors including aviation.<sup>101</sup> ICAO’s study on the market-based measures supports this argument.<sup>102</sup> According to the two quantitative assessments of the three options for a global market-based measure for international civil aviation undertaken in 2012 and 2013, the cost of introducing a market-based measure is relatively small; a market-based measure “could achieve the environmental target of stabilizing CO<sub>2</sub> emissions at a relatively low economic cost.”<sup>103</sup> The assessment in 2012 showed that, in the case where 100 percent of the costs of a market-based measure would be passed on to customers through increases in ticket price, the following would occur:

- Traffic impact: While [a market-based measure] scheme provides the environmental benefit of offsetting 464 Mt of CO<sub>2</sub> in 2036, international aviation traffic under a scheme would grow 107 per cent from 2020 to 2036; however, without the scheme the traffic level would have grown 110 per cent;
- Profit impact: Profits for the international aviation sector in 2036 would be \$33.3 billion under the scenario with [a market-based measure] scheme which would be \$0.4 billion lower than the profit level without the scheme; and

<sup>101</sup> Brand, *supra* note 98 (market-based measures “benefit sectors facing higher reduction costs”).

<sup>102</sup> See *Report on Market-based Measures*, *supra* note 76.

<sup>103</sup> *Ibid* at (vii)–(viii).

- Cost impact: The cost of [a market-based measure] scheme in 2036 would be approximately \$10 per seat for a flight of 10 000 to 12 000 kilometres and \$1.5 per seat on a flight of 900 to 1 900 kilometres.<sup>104</sup>

The 2012 study further assessed the impacts of market-based measures by taking into account another evaluative criterion, namely “Ability to accommodate the special circumstances and respective capabilities [SCRC] of developing countries”.<sup>105</sup> In this respect, three different approaches were used:

- Evaluation of six geographic regions;
- Differences between least developed States and non-least developed States; and
- Using two parameters, namely, per capita income and international aviation activity in terms of available seat kilometer by departing flights from individual States, defining level of development.<sup>106</sup>

The assessment demonstrated that the differences between impacts of market-based measure by regions or groups of States were marginal.<sup>107</sup> For example, it demonstrated that:

[The] impacts on traffic demand in the six regions...were generally consistent with the global average of a 1.2 per cent reduction. The change in operating result (profit) brought about by [a market-based measure] scheme was relatively consistent between regions, varying from 1.0 per cent to 1.3 per cent; this was generally consistent with the global average of 1.1 per cent.<sup>108</sup>

The comparison of the least developed States and non-least developed States “showed a similar pattern to that of the six regions in terms of the consistency with the global results”.<sup>109</sup> However, least developed States were not found to be as affected as non-least developed States by market-based measures.<sup>110</sup> The 2012 study concluded that “[i]mpacts on traffic levels and profits were smaller in [least developed States], although reductions in CO<sub>2</sub> were also smaller”.<sup>111</sup> Again, “[n]o differences between groups using development parameters were noted”.<sup>112</sup>

The qualitative assessment “focused on the design features of the three options...by

---

<sup>104</sup> *Ibid* at (vii)–(viii) [footnote omitted].

<sup>105</sup> *Ibid* at (viii).

<sup>106</sup> See *ibid.*

<sup>107</sup> See *ibid.*

<sup>108</sup> *Ibid.*

<sup>109</sup> *Ibid.*

<sup>110</sup> See *ibid.*

<sup>111</sup> *Ibid.*

<sup>112</sup> *Ibid.*



identifying and elaborating on the implications of different design choices”,<sup>113</sup> and concluded that:

- a global mandatory offsetting could be less complex than other two measures due to the existence of emissions units that can be used and tracked through a simple registry;<sup>114</sup>
- a global mandatory offsetting with revenue “could be more complex due to the need to determine how revenue will be collected and used”,<sup>115</sup> and
- a global emissions trading scheme “could increase complexity and have higher upfront costs due to the need to administer specific aviation allowances”.<sup>116</sup> However, this scheme would be more flexible for participants “due to the creation of emissions units, which can be traded in the marketplace”.<sup>117</sup>

The overall results of the quantitative and qualitative assessment of the three options for a global market-based measure showed that these options were “technically feasible and have the capacity to contribute to achieving ICAO’s environmental goals.”<sup>118</sup> Nevertheless, even after these assessment reports which were made available during the 38<sup>th</sup> Session of the ICAO Assembly,<sup>119</sup> only an agreement to develop a global market-based measure for international civil aviation was reached at that session. Why could ICAO Contracting States not reach an agreement to develop such measure at an earlier date, i.e. before 2016, and to implement it as soon as possible, before or

---

<sup>113</sup> *Ibid.*

<sup>114</sup> *Ibid* at (ix).

<sup>115</sup> *Ibid.* The *Report on Market-based Measures*, *ibid* at 7-1, notes:

Global mandatory offsetting complemented by a revenue generation mechanism could be more complex than global mandatory offsetting, due to the need to establish revenue generation and disbursement mechanisms. It would also be necessary to decide on how revenue will be used. The economic impact on participants is more significant than global mandatory offsetting. However, raising revenue creates a revenue stream that could be used to mitigate the environmental impacts of aircraft engine emissions, including mitigation and adaptation, as well as assistance to and support for developing States[.]

<sup>116</sup> *Ibid* at (ix). The *Report on Market-based Measures*, *ibid* at 7-1, notes:

Global emissions trading (cap-and-trade system) could be more complex and have higher upfront costs than the offsetting options, due to the need to administer aviation allowances. However, it should offer more flexibility for participants through the creation of additional emissions units, for example, an allowance, which can be traded in the marketplace. Auctioning allowances would create a revenue stream that could be used to mitigate the environmental impacts of aircraft engine emissions, including mitigation and adaptation, as well as assistance to and support for developing States[.]

<sup>117</sup> *Ibid* at (ix).

<sup>118</sup> *Ibid.* See also Petsonk, *supra* note 97 (“[t]he analysis of the policy options for a global [market-based measure] indicates that that a global [market-based measure] is cost-effective and technically feasible, while having only marginal impacts on future growth (even when revenues are generated)”).

<sup>119</sup> See ICAO, “Assembly 38th Session: Reference Documents”, online: ICAO <[www.icao.int/Meetings/a38/Pages/documentation-reference-documents.aspx](http://www.icao.int/Meetings/a38/Pages/documentation-reference-documents.aspx)>.

from 2020? Why does another decision concerning implementation of such measure need to be taken in 2016? Why can such decision not be taken before that date? A thorough analysis of the position of ICAO Contracting States during and after the 38<sup>th</sup> Session of the Assembly will answer these questions.

#### **4.3.4 The 38<sup>th</sup> Session of the ICAO Assembly and market-based measures: developed vs developing States**

At the 38<sup>th</sup> Session, the issue of environmental protection was addressed under agenda item 17. A significant number of States submitted working papers, both individually and collectively, under that agenda item.<sup>120</sup> Following the adoption of Resolution A38-18, a large number of States submitted reservations on certain paragraphs of that Resolution.<sup>121</sup> The working papers reveal that, though no single State expressly questioned the reliability of these ICAO studies, not all of them were entirely satisfied with them. Although the US supported “the results of the expert work, and in particular, the finding that [market-based measures] are technically feasible”,<sup>122</sup> twelve States proposed that feasibility and practicability of any global market-based measure for international civil aviation has to be determined not only by ICAO but also by States.<sup>123</sup> Moreover, the Kingdom of Saudi Arabia proposed that the ICAO Secretariat should undertake further study to evaluate the “economic impact of market-based measures on the developing and remote States”.<sup>124</sup>

---

<sup>120</sup> See ICAO, “Assembly 38th Session: Working Papers by Agenda Item”, online: ICAO <[www.icao.int/Meetings/a38/Pages/WP\\_Agenda.aspx](http://www.icao.int/Meetings/a38/Pages/WP_Agenda.aspx)>.

<sup>121</sup> See ICAO, “Reservations Res A38-18”, *supra* note 86.

<sup>122</sup> United States, *Addressing the Climate Impacts of Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 234, Doc A38-WP/234/Ex/79 (20 August 2013) at 3, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp234\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp234_en.pdf)> [United States, *Addressing*].

<sup>123</sup> See Argentina et al, *Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 424, Doc A38-WP/424/Ex/139 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp424\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp424_en.pdf)> [Argentina et al, *Consolidated*]; Argentina et al, *Proposed Amendments for the Draft Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 432, Doc A38-WP/432/Ex/144 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp432\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp432_en.pdf)> [Argentina et al, *Proposed*, WP 432]. These twelve States are: Argentina, Brazil, China, Cuba, Guatemala, India, the Islamic Republic of Iran, Pakistan, Peru, the Russian Federation, Saudi Arabia, and South Africa.

<sup>124</sup> Kingdom of Saudi Arabia, *Expectations and Desirable Objectives of the 38th Session of the Assembly relating to International Aviation and Climate Change – Perspective of the Kingdom of Saudi Arabia*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 176, Doc A38-WP/176/Ex/67 (20 August 2013) at 4, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp176\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp176_en.pdf)> [Kingdom of Saudi Arabia, *Expectations*].

Nevertheless, the issue of the ICAO study was not the main point of difference among States. It appears from those working papers and reservations that States mainly divided on four matters: the applicability of the principle of common but differentiated responsibilities;<sup>125</sup> the principle of special circumstances and respective capabilities; the concept of *de minimis* threshold granting exemption from any proposed national or regional market-based measure on routes to and from developing States whose share of international civil aviation activities is below certain threshold before the implementation of any global market-based measure; and ICAO aspirational goal. Divergent positions of States on the issue of the global aspirational goal of ensuring carbon neutral growth from 2020 are apparent from the reservations submitted by them.

Concerning the principle of common but differentiated responsibilities [CBDR], Australia,<sup>126</sup> New Zealand,<sup>127</sup> Canada,<sup>128</sup> the US,<sup>129</sup> Japan,<sup>130</sup> the Republic of Korea,<sup>131</sup> and forty-two States from Europe,<sup>132</sup> i.e. twenty-eight Member States of the EU and fourteen other Member

---

<sup>125</sup> The principle of common but differentiated responsibilities was first set out in the *Rio Declaration on Environment and Development*, UN Doc A/CONF.151/5/Rev.1 (1992), 31 ILM 874, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163)> [*Rio Declaration*]. *Rio Declaration*, *ibid*, Principle 7 provides:

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit to sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

<sup>126</sup> Australia, *Reservation by Australia to Resolution A38/17/2 on international aviation and climate change*, Reference: ENV 2/1 (5 November 2013), online: ICAO

<[www.icao.int/Meetings/a38/Documents/Resolutions/Australia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Australia_en.pdf)> [Australia, *Reservation*].

<sup>127</sup> New Zealand, *New Zealand's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/New\\_Zealand\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/New_Zealand_en.pdf)> [New Zealand's *Reservation*].

<sup>128</sup> Canada, *Statement of Canada's Reservations Regarding the 38<sup>th</sup> International Civil Aviation Organization General Assembly Resolution: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO

<[www.icao.int/Meetings/a38/Documents/Resolutions/Canada\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Canada_en.pdf)> [Canada, *Statement*].

<sup>129</sup> United States, *Statement of Reservation of the United States of America regarding the 38<sup>th</sup> ICAO Assembly Resolution: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO

<[www.icao.int/Meetings/a38/Documents/Resolutions/United\\_States\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/United_States_en.pdf)> [United States, *Statement of Reservation*].

<sup>130</sup> Japan, *Japan's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO

<[www.icao.int/Meetings/a38/Documents/Resolutions/Japan\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Japan_en.pdf)> [Japan's *Reservation*].

<sup>131</sup> Republic of Korea, *Statement of Reservation of the Republic of Korea Regarding Resolution A38-17/2: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate Change* (22 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Korea\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Korea_en.pdf)> [Republic of Korea, *Statement of Reservation*].

<sup>132</sup> Lithuania, *Written Statement*, *supra* note 92 at 3.

States of the European Civil Aviation Conference [ECAC],<sup>133</sup> opposed the consideration of this principle for any global market-based measure for international civil aviation. On the other hand, eighty-one States, including fifty-four African States and eighteen Member States of the Latin American Civil Aviation Commission [LACAC], supported the CBDR principle.<sup>134</sup> With regard to the principle of special circumstances and respective capabilities [SCRC], though no State opposed this principle, differences among States existed on the issue of whether or not only developing States should be considered. Sixty-five States, including fifty-four African States and three LACAC Member States,<sup>135</sup> not only favored the SCRC principle but also stressed that special circumstances and respective capabilities of developing States should only be taken into account.<sup>136</sup> On the contrary, sixty-four States, namely, Australia, the US, twenty-eight EU Member States, sixteen other Member States of ECAC, and eighteen LACAC Member States,<sup>137</sup> favored

---

<sup>133</sup> The twenty-eight EU Member States are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. The fourteen other ECAC Member States are: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Iceland, the Republic of Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, and the former Yugoslav Republic of Macedonia. See Lithuania, *Written Statement, supra* note 92.

<sup>134</sup> The fifty-four African States are: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Togo, Tunisia, Uganda, the United Republic of Tanzania, Zambia, and Zimbabwe. See 54 African States, *Position of African States on Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 272, Doc A38-WP/272/Ex/92 (11 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp272\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp272_en.pdf)>. Eighteen Member States of the LACAC are: Aruba, Belize, Bolivia, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panamá, Paraguay, Peru, and Uruguay. See Aruba et al, *Civil Aviation Developments in Latin America in Support of Air Transport Sustainability in the Region*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 317, Doc A38-WP/317/Ex/109 (10 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp317\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp317_en.pdf)>. The remaining nine States are: Argentina, Brazil, China, India, the Islamic Republic of Iran, Pakistan, the Russian Federation, Saudi Arabia, and the United Arab Emirates. See Argentina et al, *Proposed*, WP 432, *supra* note 123; Kingdom of Saudi Arabia, *Expectations, supra* note 124 at 3; United Arab Emirates, *UAE's Views on Aviation and Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 258, Doc A38-WP/258/Ex/85 (9 September 2013) at 5, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp258\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp258_en.pdf)> [*UAE's Views*].

<sup>135</sup> These three LACAC Member States are: Cuba, Guatemala, and Peru. The remaining eight States are: Argentina, Brazil, China, India, the Islamic Republic of Iran, Pakistan, the Russian Federation, and Saudi Arabia. See Argentina et al, *Consolidated, supra* note 123.

<sup>136</sup> See Argentina et al, *Consolidated, supra* note 123; Argentina et al, *Proposed*, WP 432, *supra* note 123; 54 African States, *supra* note 134.

<sup>137</sup> The sixteen other ECAC Member States are: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Iceland, the Republic of Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, the former Yugoslav Republic of Macedonia, Turkey, and Ukraine. See Lithuania, *A Comprehensive Approach to Reducing the Climate Impacts of International Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 83, Doc

the SCRC principle without any distinction between developed or developing States.<sup>138</sup> Australia went further to state that it does not accept any understanding of the SCRC principle based on differentiation between States “based on their status as developed or developing.”<sup>139</sup> Concerning the concept of *de minimis* threshold included under paragraph 16(b) of Resolution A38-18,<sup>140</sup> sixty-five States, including fifty-four African States, supported such concept.<sup>141</sup> Conversely, fifty-two States, namely, Afghanistan, Australia, Canada, Japan, New Zealand, Qatar, the Republic of Korea, Singapore, the UAE, the US, twenty-eight EU Member States, and fourteen other Member States of ECAC, strongly opposed the concept of *de minimis* threshold.<sup>142</sup> Regarding the ICAO aspirational goal, while forty-two States from Europe consider the goal as “insufficiently

---

A38-WP/83/Ex/38 (31 July 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp083\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp083_en.pdf)> [Lithuania, *A Comprehensive Approach*].

<sup>138</sup> See Australia, *Reservation*, *supra* note 126; United States, *Addressing*, *supra* note 122 at 3; Lithuania, *A Comprehensive Approach*, *supra* note 137; Aruba et al, *supra* note 134.

<sup>139</sup> Australia, *Reservation*, *supra* note 126.

<sup>140</sup> See *ICAO Res A38-18*, *supra* note 67 at I-72. According to the *de minimis* threshold, developing States whose share of international civil aviation activities is below the threshold of certain percentage of total revenue ton kilometers of international civil aviation activities would be granted exemption from the application of market-based measures for international civil aviation. Resolution A38-18 requires States, when designing new and implementing existing market-based measures for international civil aviation, to “grant exemptions for application of [market-based measures] on routes to and from developing States whose share of international civil aviation activities is below the threshold of 1% of total revenue ton kilometres of international civil aviation activities, until the global scheme is implemented”. *Ibid.*

<sup>141</sup> See Argentina et al, *Consolidated*, *supra* note 123; Argentina et al, *Proposed Amendments for the Draft Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 425, Doc A38-WP/425/Ex/140 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp425\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp425_en.pdf)>; 54 African States, *supra* note 134. Initially, Russia was against this concept. See Russian Federation, *Market-Based*, *supra* note 98.

<sup>142</sup> See Afghanistan, *Afghanistan’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Afghanistan\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Afghanistan_en.pdf)>; Australia, *Reservation*, *supra* note 126; Canada, *Statement*, *supra* note 128; Japan’s *Reservation*, *supra* note 130; New Zealand’s *Reservation*, *supra* note 127; Qatar, *Qatar’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Qatar\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Qatar_en.pdf)>; Republic of Korea, *Statement of Reservation*, *supra* note 131; Singapore, *Statement of Reservation of the Republic of Singapore on the 38<sup>th</sup> ICAO Assembly Resolution A38-17/2: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Singapore\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Singapore_en.pdf)>; UAE’s *Views*, *supra* note 134 at 6–7; United Arab Emirates, *UAE Reservation – Resolution 17/2 Environmental Protection – Climate Change* (4 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/UAE\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/UAE_en.pdf)>; United States, *Statement of Reservation*, *supra* note 129; Lithuania, *Written Statement*, *supra* note 92 at 2.

ambitious”,<sup>143</sup> only nine States, namely, Argentina, Bahrain,<sup>144</sup> Brazil,<sup>145</sup> China,<sup>146</sup> Cuba,<sup>147</sup> India,<sup>148</sup> Nicaragua,<sup>149</sup> Saudi Arabia,<sup>150</sup> and Venezuela,<sup>151</sup> are not satisfied with that goal for being burdensome on developing States mainly.<sup>152</sup>

Polar opposite positions by two groups of States are obvious. The first group consists of, with few exceptions, “developed countries” according to the country classification of the United Nations [UN],<sup>153</sup> and Annex I developed States under the *Kyoto Protocol*,<sup>154</sup> which have an obligation under that Protocol to pursue limitation or reduction of greenhouse gas emissions from aviation bunker fuels through ICAO.<sup>155</sup> The second group consists of “developing countries” according to the UN country classification,<sup>156</sup> and non-Annex I developing States under the *Kyoto Protocol*,<sup>157</sup> which do not have any obligation under that Protocol to the extent that international civil aviation is concerned. The first group did not want a further assessment of any possible option

---

<sup>143</sup> Lithuania, *Written Statement*, *supra* note 92 at 1.

<sup>144</sup> Bahrain, *Bahrain’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Bahrain\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Bahrain_en.pdf)>.

<sup>145</sup> Brazil on behalf of Argentina, Cuba and Venezuela, Letter Nr.: 416 / BRASICAO, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Brazil\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Brazil_en.pdf)> [Brazil, Letter Nr.: 416 / BRASICAO].

<sup>146</sup> China, *Statement of Reservation of China regarding Resolution 17/2 of the 38th Session of the Assembly: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/China\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/China_en.pdf)> [China, *Statement of Reservation*].

<sup>147</sup> Cuba, OR: CUB-13-126, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Cuba\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Cuba_en.pdf)>.

<sup>148</sup> India, *India’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/India\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/India_en.pdf)> [India’s *Reservation*].

<sup>149</sup> Nicaragua, NIC-ICAO-005/2013, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Nicaragua\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Nicaragua_en.pdf)>.

<sup>150</sup> Kingdom of Saudi Arabia, *Saudi Arabia’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Saudi\\_Arabia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Saudi_Arabia_en.pdf)>.

<sup>151</sup> Venezuela, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Venezuela\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Venezuela_en.pdf)>.

<sup>152</sup> See Brazil, Letter Nr.: 416 / BRASICAO, *supra* note 145; China, *Statement of Reservation*, *supra* note 146; India’s *Reservation*, *supra* note 148.

<sup>153</sup> See UN, *World Economic Situation and Prospects 2015* (New York: UN, 2015) at 135 ff, online: UN <[www.un.org/en/development/desa/policy/wesp/wesp\\_archive/2015wesp\\_full\\_en.pdf](http://www.un.org/en/development/desa/policy/wesp/wesp_archive/2015wesp_full_en.pdf)> [UN, *World Economic Situation and Prospects 2015*].

<sup>154</sup> See UNFCCC, “List of Annex I Parties to the Convention”, online: UNFCCC <[unfccc.int/parties\\_and\\_observers/parties/annex\\_i/items/2774.php](http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php)>; UNFCCC, “Status of Ratification of the Kyoto Protocol”, online: UNFCCC <[unfccc.int/kyoto\\_protocol/status\\_of\\_ratification/items/2613.php](http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php)> [“Status of Ratification of the Kyoto Protocol”].

<sup>155</sup> See *Kyoto Protocol*, *supra* note 4, art 2(2).

<sup>156</sup> See UN, *World Economic Situation and Prospects 2015*, *supra* note 153 at 135 ff.

<sup>157</sup> See UNFCCC, “List of Non-Annex I Parties to the Convention”, online: UNFCCC <[unfccc.int/parties\\_and\\_observers/parties/non\\_annex\\_i/items/2833.php](http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php)>; “Status of Ratification of the Kyoto Protocol”, *supra* note 154.

to market-based measure by ICAO as well as by States, opposed the principle of common but differentiated responsibilities and the concept of *de minimis* threshold, did not favor any distinction between developed and developing States with respect to the principle of special circumstances and respective capabilities, and considered the ICAO aspirational goal as “insufficiently ambitious”. On the contrary, the second group of States held the opposite view.

It is now obvious that, with respect to a global market-based measure for international civil aviation, the positions of developed and developing States have become polarized. This is not surprising, especially as disagreement between developed and developing States is not a new phenomenon in the climate change debate. Unless these differences between developed and developing economies are reconciled, any attempt to combat climate change and global warming from any sector, including aviation, is doomed to failure.<sup>158</sup> In such circumstances, it will not be wise to accommodate the demands of either group of States since preferential treatment to any group will further complicate the already complicated situation. A compromise solution has to be reached as soon as possible by striking a balance between the interests of both developed and developing States. Extensive participation by States is required for any global market-based measure to become effective. Several methods can be employed to attract greater participation by States.

#### **4.3.5 Reconciling the differences between developed and developing States**

##### **4.3.5.1 Representation**

Since, as mentioned earlier, developing States did not completely rely on the ICAO studies on three possible options for a global market-based measure, and required further assessment by ICAO as well as by States, one way to partially, if not entirely, solve this problem of lack of credibility may be increasing the level of representation of developing States in the CAEP. In fact, during the 38<sup>th</sup> Session, eighteen LACAC Member States raised their concern regarding the issue of developing States’ representation in the CAEP and proposed a higher level of representation of developing States in that group.<sup>159</sup> If the representation is increased, any allegation from

---

<sup>158</sup> Disagreement between developed and developing States is addressed in Chapter 6, *below*.

<sup>159</sup> Aruba et al, *supra* note 134 at 2, noted:

LACAC [Member] States acknowledge the work done by the CAEP in favour of the environment and civil aviation. However, developing countries are barely represented in the aforementioned group.

developing States, e.g., the issue of fewer representation, lack of transparency, and ignoring their voice, will be reduced and, as a consequence, participation by developing States in any resultant global market-based measure be increased. Moreover, directly engaging these States in the CAEP process will save valuable time since, in such a case, a joint assessment can be performed simultaneously leading to a single outcome, which can be labelled as global, without the requirement for individual, unconnected assessment from States. Individual study by States should be dissuaded since it is highly likely that the outcome of these studies may be biased in favor of the concerned State and, hence, will suffer from a lack of confidence from other States. Representation of developing States in ICAO processes, particularly in the CAEP, is further discussed in Chapter 6 below.<sup>160</sup>

#### **4.3.5.2 Common but differentiated responsibilities**

As mentioned earlier and as is apparent from the 38<sup>th</sup> Assembly, although inclusion of the common but differentiated responsibilities [CBDR] principle in any global market-based measure will enjoy less participation by developed States than expected, inclusion of this principle is vital to obtain greater participation by developing States. Inclusion of the CBDR principle will lead to more responsibilities on the part of developed States and, in certain circumstances, exempt developing States from any obligation at all. Essentially, the CBDR principle includes two elements:

- “the common responsibility of states for the protection of the environment, or parts of it, at the national, regional and global levels”; and
- “the need to take account of differing circumstances, particularly in relation to each state’s *contribution* to the creation of a particular environmental problem and its *ability* to prevent, reduce and control the threat”.<sup>161</sup>

The CBDR principle is “based on the perception that global environmental risks, such as climate change, have mainly been caused by and should therefore be tackled primarily by

---

Consequently, ICAO must take the corresponding actions to increase the level of representation of those countries, so that their needs and reality may be reflected through their contributions in the CAEP. These States recommended, *ibid* at 3, that “as a matter of urgency, developing countries must be duly represented in the CAEP”, and, hence, they invited the Assembly to “require a higher level of representation of developing countries in the CAEP.”

<sup>160</sup> See ch 6, *below*.

<sup>161</sup> Sands et al, *supra* note 37 at 233 [emphasis in original].



developed states.”<sup>162</sup> In fact, Principle 7 of the *Rio Declaration*, where this principle was expressed for the first time, provides that States have common but differentiated responsibilities because of their different contributions to global environmental degradation, and the developed States acknowledge their responsibility “to sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command”.<sup>163</sup> The imposition of the responsibility to primarily tackle climate change on developed States by the CBDR principle is the main reason why developed States strongly opposed, and continue to oppose, this principle.

However, it should be stressed that the CBDR principle “was never intended to be a justification for allowing developing states to dump pollution on each other.”<sup>164</sup> The CBDR principle “has developed from the application of equity in general international law”,<sup>165</sup> and can be “seen to define an explicit equitable balance between developed and developing states”.<sup>166</sup> The CBDR principle has become one of the “important modifiers of existing rules and treaties, or influenced the negotiation and elaboration of treaty regimes.”<sup>167</sup> This principle “lies at the heart of the international compact on climate change”.<sup>168</sup> Due to this importance, courts, governments, or international organizations and treaty bodies cannot ignore the CBDR principle.<sup>169</sup> In reality, acceptance of the CBDR principle “was one of the conditions for ensuring the widest possible participation by developing” States under the *UNFCCC*.<sup>170</sup> Hence, the CBDR principle needs to

---

<sup>162</sup> Birnie, Boyle & Redgwell, *supra* note 12 at 136.

<sup>163</sup> *Rio Declaration*, *supra* note 125, Principle 7.

<sup>164</sup> Birnie, Boyle & Redgwell, *supra* note 12 at 136.

<sup>165</sup> Sands et al, *supra* note 37 at 233.

<sup>166</sup> Birnie, Boyle & Redgwell, *supra* note 12 at 133.

<sup>167</sup> *Ibid* at 38.

<sup>168</sup> Joanne Scott & Lavanya Rajamani, “EU Climate Change Unilateralism” (2012) 23:2 Eur J Intl L 469 at 476. Scott & Rajamani, *ibid* at 477, contend that:

[E]ven if this principle does not assume the character of a legal obligation in itself, it is a fundamental part of the conceptual apparatus of the climate change regime, such that it forms the basis for the interpretation of existing obligations and the elaboration of future international legal obligations within the regime in question. Indeed, it is arguable that any future legal regime must be consistent with the CBDRRC principle in order to meet the requirements of the Convention, as well as the duties to perform and interpret a treaty in good faith. The fact that it is a fundamental part of the conceptual apparatus of the climate change regime also implies, in our view, that state parties are obliged not just to interpret current obligations and fashion new ones in keeping with the CBDRRC principle, but also to take this principle into account in their unilateral actions vis-à-vis other parties.

<sup>169</sup> See Birnie, Boyle & Redgwell, *supra* note 12 at 38.

<sup>170</sup> *Ibid* at 135.

be included to ensure greater participation by developing States.<sup>171</sup>

Nevertheless, as argued before, the application of the CBDR principle to any global market-based measure for international civil aviation with the current categorization of States on the basis of their development status may see reluctance of developed States to participate in that measure and may be considered unfair. This is due to the fact that a significant number of developing States under the *Kyoto Protocol* have well-developed, extremely competitive, well-capitalized, and rapidly growing airlines.<sup>172</sup> Member States of the EU and the ECAC already raised this point in their reservation to Resolution A38-18.<sup>173</sup> It is undeniable that any climate change and global warming mitigation measure will become less effective if a majority of developed States refuses to participate in that measure. Therefore, a new classification of developed and developing States for the purposes of aviation is necessary.<sup>174</sup>

This new classification should be based on, *inter alia*, the size, growth, average age of fleet, current and projected financial condition including capital, profitability, and competitiveness of airlines. Under the new classification, a State will be classified as developed for the purposes of international aviation if a majority of its airlines are large, developed, growing, operating younger aircraft with advanced technology, well-capitalized, currently generating and projected to generate higher yield, and very competitive. While inclusion of the CBDR principle in any global market-based measure for aviation will garner more developing States' participation, this new classification will attract participation by developed States since this new classification will cause the elevation of some developing States to developed State status and, simultaneously, demotion of some developed to developing State status.

However, even after this new classification, there is every possibility that States, mainly developed, may argue against the CBDR principle since it conflicts with the well-established

---

<sup>171</sup> The United Arab Emirates does not view the principle as the stumbling block that interrupts the advancement of ICAO's work on market-based measures but as "the enabler that will induce participation and active involvement within its membership." *UAE's Views*, *supra* note 134 at 5.

<sup>172</sup> See e.g. Suzana Kahn Ribeiro et al, "Transport and its infrastructure" in Bert Metz et al, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 323 ("[i]n the developing world, ... air travel is growing rapidly in some areas – 12% per year in China, for example" at 330).

<sup>173</sup> See Lithuania, *Written Statement*, *supra* note 92 ("[m]any carriers based in less developed countries are in fact among the largest, the most advanced and the most profitable in the world" at 3).

<sup>174</sup> See de Mestral & Ahmad, *supra* note 33 at 6.

principles of non-discrimination and equality of opportunity under the *Chicago Convention*.<sup>175</sup> States that opposed the CBDR principle for international aviation already argued this point during and after the 38<sup>th</sup> Assembly.<sup>176</sup> In this regard, the Republic of Korea stated:

CBDR requires careful assessment if it is to be transplanted into international aviation, since the non-discrimination principle under the Chicago Convention, which is conceptually contradictory to CBDR, has stood the test of time for decades and has contributed greatly to the development of international civil aviation.<sup>177</sup>

States must appreciate the fact that the *Chicago Convention* was signed at a time when environmental costs and benefits were viewed as incidental to largely economic concerns such as the exploitation of living natural resources.<sup>178</sup> Emissions from aviation “emerged as a problem in the 1970s”,<sup>179</sup> and the need to protect the environment was not envisaged at the time of negotiation and drafting of the *Convention* in 1944. As a consequence, no explicit provisions on the protection of the environment was incorporated therein.<sup>180</sup> Moreover, States must appreciate that international environmental law is a relatively new area of international law and the CBDR principle itself is an emerging principle of international environmental law, “the evolution of [which] can be best observed in” the *Vienna Convention*,<sup>181</sup> the *UNFCCC*, and the *Convention on Biological Diversity*,<sup>182</sup> all of which attracted very wide ratification, thus pointing “to near universal

---

<sup>175</sup> According to the UNFCCC, “reconciling its decision-making principles of CBDR with the ICAO’s principle of non-discrimination requires ‘mutual respect between the two processes, political leadership and innovative thinking’, but this stops short of providing any real clarification or certainty.” Steven Truxal, “The ICAO Assembly Resolutions on International Aviation and Climate Change: An Historic Agreement, a Breakthrough Deal, and the Cancun Effect” (2011) 36:3 Air & Space L 217 at 219 [footnote omitted] (Kluwer Law Online). However, the International Air Transport Association argues that the airline industry “believes that, with some political leadership and innovative solutions, the principles of equal treatment between airlines and differentiated responsibilities for [states] are completely consistent in the context of international aviation.” International Air Transport Association, *Aviation and Climate Change: Pathway to Carbon-Neutral Growth in 2020* (Switzerland: IATA, 2009), online: IATA <[www.iata.org/whatwedo/environment/Documents/aviation-climatechange-pathway-to2020.pdf](http://www.iata.org/whatwedo/environment/Documents/aviation-climatechange-pathway-to2020.pdf)>. See also International Air Transport Association, *A Global Approach to Reducing Aviation Emissions: First Stop: Carbon-Neutral Growth from 2020* (Switzerland: IATA, 2009), online: IATA <[www.iata.org/whatwedo/environment/Documents/global-approach-reducing-emissions.pdf](http://www.iata.org/whatwedo/environment/Documents/global-approach-reducing-emissions.pdf)>.

<sup>176</sup> See Australia, *Reservation*, *supra* note 126; Republic of Korea, *Statement of Reservation*, *supra* note 131; Canada, *Statement*, *supra* note 128; Lithuania, *Written Statement*, *supra* note 92 at 3.

<sup>177</sup> Republic of Korea, *Statement of Reservation*, *supra* note 131.

<sup>178</sup> See Catherine Redgwell, “International Environmental Law” in Malcolm D Evans, ed, *International Law*, 3rd ed (New York: Oxford University Press, 2010) 687 at 687, 690.

<sup>179</sup> Dempsey, *supra* note 17 at 444.

<sup>180</sup> See also ICAO, *The Convention on International Civil Aviation: Annexes 1 to 18*, online: ICAO <[www.icao.int/safety/airnavigation/NationalityMarks/annexes\\_booklet\\_en.pdf](http://www.icao.int/safety/airnavigation/NationalityMarks/annexes_booklet_en.pdf)>.

<sup>181</sup> *Vienna Convention for the Protection of the Ozone Layer*, 22 March 1985, 1513 UNTS 293, Can TS 1988 No 23 (entered into force 22 September 1988) [*Vienna Convention*].

<sup>182</sup> *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79, Can TS 1993 No 24 (entered into force 29 December 1993).

acceptance of the [CBDR] principle”.<sup>183</sup> On the whole, the CBDR principle is “probably the best implemented of all the international environmental principles within the climate change regime.”<sup>184</sup>

In the *Gabčíkovo-Nagymaros Project* case,<sup>185</sup> the International Court of Justice [ICJ] noted, in the context of the need to reconcile economic development with the protection of the environment, that new norms and standards have been developed during the last two decades “[o]wing to new scientific insights and to a growing awareness of the risks for mankind...of pursuit of such interventions at an unconsidered and unabated pace,” and that “[s]uch new norms have to be taken into consideration, and such new standards given proper weight, not only when States contemplate new activities but also when continuing with activities begun in the past.”<sup>186</sup> This dictum of the ICJ was applied by the arbitral tribunal of the Permanent Court of Arbitration in the *Iron Rhine Arbitration*.<sup>187</sup> Therefore, it will not be prudent to embrace archaic, though established, principles, namely the principles of non-discrimination and equality of opportunity, enshrined in a treaty, namely the *Chicago Convention*, that does not address a very recent global problem, namely, climate change and global warming, and to simultaneously discard a new principle, namely the CBDR principle, that deals with that global problem and can ensure widespread participation by developing States in any global market-based measure for international civil aviation.

However, in one sense, there does not exist any conflict between the CBDR principle and the principles of non-discrimination and equality of opportunity. As noted above, the CBDR principle “has developed from the application of equity in general international law,”<sup>188</sup> and can be “seen to define an explicit *equitable balance* between developed and developing states”.<sup>189</sup> “Equity is equality” is a well-known equitable maxim and, hence, as an equitable principle, one of the purposes of the CBDR principle is to ensure equality between States but in an equitable way.<sup>190</sup>

---

<sup>183</sup> Birnie, Boyle & Redgwell, *supra* note 12 at 132.

<sup>184</sup> Maguire, *supra* note 37 at 110.

<sup>185</sup> *Case concerning the Gabčíkovo-Nagymaros Project (Hungary v Slovakia)*, [1997] ICJ Rep 7.

<sup>186</sup> *Ibid* at 78.

<sup>187</sup> See *Award in the Arbitration regarding the Iron Rhine Railway (Belgium v Netherlands)* (2005), ICGJ 373 at paras 59, 221 (Permanent Court of Arbitration) [*Iron Rhine Arbitration*].

<sup>188</sup> Sands et al, *supra* note 37 at 233.

<sup>189</sup> Birnie, Boyle & Redgwell, *supra* note 12 at 133 [emphasis added].

<sup>190</sup> See also Lavanya Rajamani, “The Principle of Common but Differentiated Responsibility and the Balance of Commitments under the Climate Regime” (2000) 9:2 RECIEL 120 at 122–23.

The CBDR principle, Hardeman argues, “serves to achieve *substantive equality* between developing and developed States within a regime, using tools such as grace periods or delayed implementation, less stringent commitments and international assistance, including financial aid and technology transfer.”<sup>191</sup> The question of discrimination and inequality of opportunities should not arise from the application of the CBDR principle in international civil aviation, since the CBDR principle tends to ensure “equitable balance” or “substantive equality” between developed and developing States. This will offer equal opportunity to airlines from both groups of States and, hence, there will be no discrimination between States.

Moreover, ICAO has a positive duty to ensure that “every contracting State has a *fair* opportunity to operate international airlines”.<sup>192</sup> The term “fair” is an equitable term that includes equality. It also includes reasonable, legitimate, appropriate, and just.<sup>193</sup> As an equitable principle, the CBDR principle endeavors to ensure fairness, not only equality. Hence, adoption of the CBDR principle by ICAO should not be viewed as confronting the established principles of non-discrimination and equality of opportunity.

#### **4.3.5.3 Special circumstances and respective capabilities**

In contrast to the CBDR principle, all States appear to favor the principle of special circumstances and respective capabilities [SCRC], though disagreement existed whether or not only developing States should be considered. The SCRC principle is an evolving principle and, as argued by the Russian Federation, may slowly replace the CBDR principle.<sup>194</sup> Nevertheless, there

---

<sup>191</sup> Hardeman, *supra* note 98 at 27 [emphasis added]. Similarly, Rajamani, *supra* note 190 at 123 [footnotes omitted], asserts:

In practice the principle of common but differentiated responsibility legitimizes asymmetry of commitments under a regime. States with differing levels of responsibility, determined by the measures which the principle of common but differentiated responsibility identifies, have different commitments under the climate regime. Although asymmetrical rights and duties among States are not new in themselves, they do constitute a deviation from the traditional international law principle of sovereign equality that requires legal (formal) equality between States. Asymmetrical treatment, as permitted by the principle of common but differentiated responsibilities however, is legitimized due to differences in financial and technological capabilities, developmental priorities and equitable considerations with regard to proportional contributions to the environmental crisis. Asymmetrical treatment focuses on the enhancement of substantive equality and international co-operation and constitutes a useful tool to ensure universal participation and effective implementation of international environmental accords.

<sup>192</sup> *Chicago Convention*, *supra* note 42, art 44(f) [emphasis added].

<sup>193</sup> See *Merriam-Webster's Dictionary of Law*, *sub verbo* “fair”; *Oxford Advanced Learner's Dictionary*, *sub verbo* “fair”; *Cambridge Dictionaries Online*, *sub verbo* “fair”; *Oxford Dictionaries*, *sub verbo* “fair”.

<sup>194</sup> See Russian Federation, *Market-Based*, *supra* note 98 at 5.

does not exist any universally accepted understanding of the SCRC principle. While developing States emphasized that only the special circumstances and respective capabilities of developing States should be taken into account, developed States denied that understanding.<sup>195</sup>

Nevertheless, a close analysis of the CBDR principle demonstrates that it already includes the new principle of SCRC. It appears from the second element of the CBDR principle, mentioned above, that the SCRC principle is already covered by the CBDR principle. Because different *circumstances* of States, especially with respect to their contribution to the creation of a specific environmental problem, and their *capability* to prevent, reduce, and control the hazard have to be considered under the CBDR principle.<sup>196</sup> In any case, we have to wait for a balanced, acceptable, and uniform definition of the SCRC principle from the ICAO Contracting States. Aviation groups, namely the Airports Council International, the Civil Air Navigation Services Organisation [CANSO], the International Air Transport Association [IATA], the International Business Aviation Council, and the International Coordinating Council of Aerospace Industries Associations, favor the SCRC principle.<sup>197</sup> The only environmental non-governmental organization allowed to participate in ICAO processes, namely the International Coalition for Sustainable Aviation [ICSA], also supports the principle.<sup>198</sup> However, these aviation groups suggest that only governments can decide whether or not to take account of the SCRC principle and, if so, how.<sup>199</sup> If the governments elect to do so, “it should be done in such a way as to minimize market distortion by granting equal treatment to all operators on a given route”, they further suggest.<sup>200</sup>

#### **4.3.5.4 De minimis threshold**

With respect to the concept of a *de minimis* threshold,<sup>201</sup> although developing States

---

<sup>195</sup> See e.g. Australia, *Reservation*, *supra* note 126.

<sup>196</sup> See Sands et al, *supra* note 37 at 233.

<sup>197</sup> See Airports Council International et al, *supra* note 96.

<sup>198</sup> See ICSA, *Effective*, *supra* note 93.

<sup>199</sup> See Airports Council International et al, *supra* note 96, Appendix.

<sup>200</sup> *Ibid.*

<sup>201</sup> Under this concept, entities engaged in an activity that is regulated by a market-based measure will be granted exemption from the application of that measure if their share in that regulated activity falls below certain threshold. According to *Resolution A38-18*, air carriers on routes to and from developing States should be granted exemption from the application of any national/regional market-based measure if their share of international civil aviation activities falls below the threshold of 1 percent of total revenue ton kilometers of such activities, before the implementation of any global market-based measure. See *ICAO Res A38-18*, *supra* note 67 at I-72.

avored that concept, it is preferable not to consider such concept for any global market-based measure due to the fact that, as ICAO's *de minimis* study reveals, this concept can lead to substantive market distortions between operators subject to a market-based measure and operators not subject to the same measure.<sup>202</sup> The quantitative analysis, which was performed by the MVA Consultancy and was presented to the ICAO Council on January 20, 2012,<sup>203</sup> concluded that, under the *de minimis* threshold, all market-based measures "could suffer market distortion and reduced effectiveness."<sup>204</sup> The impact of such a threshold "could also create incentives for airlines to fragment, create subsidiaries or split ownership in order to avoid" any market-based measures.<sup>205</sup> Conversely, aircraft operators "may avoid mergers or consolidations in order to avoid losing the *de minimis* status. This could result in the loss of efficiencies within the sector".<sup>206</sup>

The Russian Federation argued that, in addition to the issue of market distortion, this concept "will stimulate further widening of the gap between the levels of scientific-technological development of Countries with different economic potential."<sup>207</sup> If "the absence of a stimulatory environment for the adoption of innovative solutions for aviation sector infrastructure development at the level of Governments" is added to this, Russia further argued, "it is evident that the principle of "*de minimis*" will play the role of a stagnation factor to a large number of developing" States.<sup>208</sup> The UAE argued, *inter alia*, that "there is no technical, legal or environmental justification to adopt such *de minimis* [concept]".<sup>209</sup> Therefore, the concept of *de minimis* should not be considered for any global market-based measure for international civil aviation.

#### **4.3.5.5 Conclusion**

It can be concluded, from the foregoing, that both developed and developing States are required to accommodate the interests of each other by sacrificing some of their own interests if they "really" desire to see the development and implementation of a global market-based measure

---

<sup>202</sup> See ICAO Council, *Market-Based*, *supra* note 81 at 3 (according to the study, "[o]perators falling within the *de minimis* threshold represented approximately 20 per cent of all operators" [emphasis in original]).

<sup>203</sup> See *UAE's Views*, *supra* note 134 at 7.

<sup>204</sup> ICAO Council, *Market-Based*, *supra* note 81 at 3.

<sup>205</sup> *Ibid.*

<sup>206</sup> *Ibid* [emphasis in original].

<sup>207</sup> Russian Federation, *Market-Based*, *supra* note 98 at 5.

<sup>208</sup> *Ibid* [emphasis in original].

<sup>209</sup> *UAE's Views*, *supra* note 134 at 7 [emphasis in original].

for international civil aviation with widest possible participation by States. A change of heart cannot occur so easily; concession from both sides is required. ICAO's study on market-based measures has found that a global market-based measure for international civil aviation is cost-effective and technically feasible, has only marginal impacts on future growth, and has the capacity to contribute to achieving ICAO's environmental goals. The study also found that the difference between impacts of market-based measures by regions or groups of States were marginal, and impacts on traffic levels and profits were smaller in least developed States.<sup>210</sup> Thus, States should not delay the process of development of global market-based measure for international civil aviation due to their divergent positions on certain matters.

#### **4.3.6 A prospective global market-based measure for international civil aviation**

##### **4.3.6.1 Potential benefits**

For international civil aviation, a well-designed market-based measure is required since such a measure can “use emissions banking, trading, offsetting to spur innovation”, “reward those who achieve real emission reductions”, “save money...by promoting competition to achieve reductions better, cheaper, faster”, and “provide certainty that environmental targets will be met”.<sup>211</sup> Market-based measures “provide participants with flexibility to choose between the implementation of emission reduction measures within their own sector, or offsetting those CO<sub>2</sub> emissions in other sectors.”<sup>212</sup> This fact is particularly important for the aviation industry since in-sector emissions reductions are expensive and limited in this industry.<sup>213</sup> The IPCC fourth assessment report supports the same.<sup>214</sup> Hence, the IPCC concluded that, “if aviation were to

---

<sup>210</sup> See *Report on Market-based Measures*, *supra* note 76.

<sup>211</sup> Petsonk, *supra* note 97. See also ICAO Secretariat, “Overview – Market”, *supra* note 74 at 138. However, “many governments in the developing world are questioning whether market approaches are able to deliver on the needs they have for sustainable development.” Andrew Howard, “Status and Structure of the Carbon Market” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 132 at 135. For example, the Russian Federation, *Market-Based*, *supra* note 98 at 3, contended that “introduction of [market-based measures] will lead to increasing of CO<sub>2</sub> emission volume in the international civil aviation sector and, as a result, will have a negative impact on the general level of flights safety and on a sustainable development of air transport”. The Kingdom of Saudi Arabia, *Expectations*, *supra* note 124 at 4, urged to focus “on more effective measures, other than the market-based ones, to reduce emissions.”

<sup>212</sup> ICAO Secretariat, “Overview – Market”, *supra* note 74 at 138.

<sup>213</sup> See *ibid.*

<sup>214</sup> See Ribeiro et al, *supra* note 172 at 376; Terry Barker et al, “Technical Summary” in Bert Metz et al, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 25 at 91; Gupta et al, *supra* note 1 at 781.



achieve the same environmental goal under emission trading..., the economic costs for the sector and for the economy as a whole would be lower if this was done under an emission trading scheme including other sectors rather than under a charging system for aviation only.”<sup>215</sup>

However, any attempt to include other sectors in any market-based measure for aviation would cause further complicacy and prolong the process. In fact, the same IPCC report provides that agreement within a sector “may provide an additional degree of policy flexibility and make comparing efforts within a sector between countries easier”.<sup>216</sup> Additionally, as noted above, ICAO’s study on market-based measures concluded that a global market-based measure for the aviation sector is cost-effective.<sup>217</sup> Therefore, no global market-based measure for the aviation sector should be tied up with measures in other sector(s).<sup>218</sup>

As economic instruments, market-based measures may provide financial incentives to direct behavior toward environmentally responsible activity.<sup>219</sup> By placing a price on carbon, a market-based measure incentivizes “further efficiency improvements and the adoption of new technologies.”<sup>220</sup> The IPCC concluded that policies that include economic instruments, which “provide a real or implicit price of carbon”, can “create incentives for producers and consumers to significantly invest in [low greenhouse gas] products, technologies and processes.”<sup>221</sup> Therefore, a global market-based measure for international civil aviation is imperative to incentivize in-sector

---

<sup>215</sup> Ribeiro et al, *supra* note 172 at 376.

<sup>216</sup> Barker et al, *supra* note 214 at 91

<sup>217</sup> See *Report on Market-based Measures*, *supra* note 76.

<sup>218</sup> Hardeman, *supra* note 98 at 4, argues that, “to enable aviation to make a tangible and timely contribution towards a low-carbon economy, without compromising the vast socioeconomic benefits it brings to society, a global climate policy framework for the sector must be developed based on its own merits, decoupled – although not isolated – from other areas of climate politics.”

<sup>219</sup> See ICAO Secretariat, “Overview – Market”, *supra* note 74 at 139.

<sup>220</sup> *Ibid.* See ICASA, *Effective*, *supra* note 93 (introduction of “a carbon price...will further encourage airlines to speed up deployment of technical, operational and alternative fuel measures” at 3). Jörn Scherzer and Melanie Hutton of the New Zealand Ministry of Transport reported that emissions trading “mechanisms on fuel present an incentive for airlines to review areas where they can increase efficiencies and optimize operations to reduce fuel usage. In this way the mechanisms promote measures such as biofuel investment and the use of more efficient aircraft, helping to reduce [the mechanisms] financial impacts.” Jörn Scherzer & Melanie Hutton, “Aviation Impacts of the New Zealand Emissions Trading Scheme” (2011) 66:3 ICAO Journal 16 at 16, online: ICAO <[www.icao.int/publications/journalsreports/2011/6603\\_en.pdf](http://www.icao.int/publications/journalsreports/2011/6603_en.pdf)>. However, Russia does not support this. In the working paper submitted to the 38<sup>th</sup> Session of Assembly, Russia stated that, “[i]n view of low profitability of aviation business, it is possible to conclude that market-based measures will have a negative impact on the sector’s ability to make necessary investments into programs of renewal and modernization of aircraft’s fleet, into introductions of new technologies and procedures.” Russian Federation, *Market-Based*, *supra* note 98 at 3.

<sup>221</sup> IPCC, “Summary: Mitigation 2007”, *supra* note 95 at 19.

reductions.<sup>222</sup> Furthermore, as Professors Havel and Sanchez argue, revenues generated through market-based measures can be, in limited cases, used “to assist developing countries in their own emissions reduction efforts”.<sup>223</sup> Hence, they argue that a sector-specific agreement to make meaningful cuts in aircraft engine emissions should rely primarily on market-based measures to achieve its emissions reduction goals.<sup>224</sup>

#### **4.3.6.2 Necessary elements**

Any market-based measure for international civil aviation must satisfy the four principal criteria, namely, environmental effectiveness, cost-effectiveness, distributional considerations, and institutional feasibility, used to assess environmental policy instruments for climate change mitigation.<sup>225</sup> The measure must be global in scope, fair, preserve fair competition, avoid any competitive distortions, and take into account different types and levels of operator activity.<sup>226</sup>

Market-based measures are designed to achieve “a clear environmental objective” that “can be established with a baseline or cap on emissions levels.”<sup>227</sup> The distribution of this environmental objective among participants forms “individual obligations, which collectively respect the environmental objective.”<sup>228</sup> Both the ICAO Contracting States and aircraft operators would have crucial roles to play in global market-based measures,<sup>229</sup> if adopted. It will be important to differentiate between the compliance obligations, which will be placed on the participants of a market-based measure, and implementation responsibilities.<sup>230</sup> Generally, compliance obligations could be tracked through a registry, which, at a minimum, records the environmental objective of a market-based measure, “the emissions of each participant, the obligation of each participant to surrender emissions units and the tracking of emissions units to ensure participants’ obligations are respected.”<sup>231</sup> A vigorous monitoring, reporting, and verification system is key to the success

---

<sup>222</sup> See ICSA, *Effective*, *supra* note 93 at 3.

<sup>223</sup> Havel & Sanchez, *supra* note 31 at 376 [footnote omitted].

<sup>224</sup> See *ibid.*

<sup>225</sup> See also Gupta et al, *supra* note 1 at 751.

<sup>226</sup> See Airports Council International et al, *supra* note 96 at 2; ICSA, *Effective*, *supra* note 93 at 3.

<sup>227</sup> *Report on Market-based Measures*, *supra* note 76 at (viii).

<sup>228</sup> *Ibid.*

<sup>229</sup> See also *ibid.*

<sup>230</sup> See *ibid.*

<sup>231</sup> *Ibid.*

of any market-based measure in effectively combating climate change and global warming.<sup>232</sup> Because such a vigorous system will ensure “that one unit of emissions emitted and recorded in one jurisdiction is directly comparable to a unit in another jurisdiction”.<sup>233</sup> Additionally, this will protect fair market competition and avoid market distortion.<sup>234</sup> However, for fairness and convenience, provisions should be made to the effect that each operator reports its emissions to one State only, emissions are accounted for only once, and duplication with existing market-based measures are avoided.<sup>235</sup>

#### **4.3.6.3 Choice of options**

Any of the three options for a global market-based measure under consideration by ICAO, namely, global mandatory offsetting, global mandatory offsetting with revenue, and global emissions trading,<sup>236</sup> can be adopted for implementation from 2020, since all of those measures were found to be technically feasible, cost-effective, having marginally impact on future growth, and having the capacity to contribute to achieving ICAO’s environmental goals.<sup>237</sup> It is worth noting that Resolution A38-18 does not mention “three options” but “possible options”,<sup>238</sup> the word “three” being replaced with the word “possible” due to a proposal for amendment from the Russian Federation.<sup>239</sup> In this respect, Russia stated, “[u]ltimately, it is not obvious that only three...options, which have been considered by the ICAO Council previously, can be candidates for the global implementation.”<sup>240</sup> Therefore, more “possible” options, which are unknown at present, in addition to these three options may be considered in future that has the potential to further delaying the entire process. It should be borne in mind that Russia does not support any

---

<sup>232</sup> See *ibid.*

<sup>233</sup> *Ibid.*

<sup>234</sup> See *ibid.*

<sup>235</sup> See Airports Council International et al, *supra* note 96 at 4.

<sup>236</sup> With regard to emissions trading, Havel & Sanchez, *supra* note 31 at 377 [footnotes omitted], argue:

[E]missions trading, to the extent it is allowed to function without government distortion, allows the market to set the price necessary to induce emissions reduction. The choice of [market-based measure] will also take account of the comparative administrative costs associated with each measure. Moreover, a carbon trading scheme would have the further advantage of smoother integration into a future global climate change arrangement where emissions credits could be cross-traded among industrial sectors.

<sup>237</sup> However, these market-based measures are not without criticism. For criticisms regarding carbon offsetting, see Hardeman, *supra* note 98 at 23–24. For criticisms regarding carbon trading, see *ibid* at 16–22.

<sup>238</sup> See ICAO Res A38-18, *supra* note 67 at I-72.

<sup>239</sup> See Russian Federation, *Proposed Improvements*, *supra* note 87 at 3.

<sup>240</sup> *Ibid.*

market-based measure for international civil aviation, which is apparent from the position of this State during and after the 38<sup>th</sup> Session of the Assembly,<sup>241</sup> and, hence, it is highly likely that any proposal from this State would be an attempt to thwart any progress in this respect. States in favor of a global market-based measure for international civil aviation should not support such proposal from any State that can cause further delay. Unfortunately, no single State submitted any reservation on paragraph 19(a) of Resolution A38-18.<sup>242</sup>

The aviation industry believes that, among those three options, “a simple carbon offsetting scheme would be the quickest to implement, the easiest to administer and the most cost-efficient.”<sup>243</sup> At the 69<sup>th</sup> Annual General Meeting of IATA, a resolution on the implementation of the aviation carbon-neutral growth (CNG2020) strategy was overwhelmingly endorsed.<sup>244</sup> The resolution urged IATA member airlines to encourage governments to adopt, at the 38<sup>th</sup> Session of the ICAO Assembly held in 2013, a commonly agreed, single global market-based measure for international civil aviation and mentioned airlines’ preference for a single mandatory carbon offsetting to other options.<sup>245</sup> IATA already established a voluntary carbon offset program,<sup>246</sup> and, at the time of this writing, over 30 member airlines of IATA have introduced a carbon offset program.<sup>247</sup> ICAO’s assessment on the current and future availability, and prices of offset credits, referred to as Certified Emission Reductions [CERs], generated under the Clean Development Mechanism [CDM] of the *Kyoto Protocol* “indicated that there would be sufficient levels of credits available for the international [civil] aviation sector.”<sup>248</sup> Offset credits under the CDM are high-quality, secured to at least 2023, easily accessible, easily filtered, and scalable to meet demand.<sup>249</sup>

---

<sup>241</sup> See Russian Federation, *Market-Based*, *supra* note 98; Russian Federation, *Statement*, *supra* note 98.

<sup>242</sup> See ICAO, “Reservations Res A38-18”, *supra* note 86.

<sup>243</sup> Airports Council International et al, *supra* note 96 at 3.

<sup>244</sup> See IATA, “Historic Agreement”, *supra* note 97.

<sup>245</sup> See *Resolution on the Implementation of the Aviation “CNG2020” Strategy*, International Air Transport Association Annual General Meeting, 69th Sess (2013), online: IATA <[www.iata.org/pressroom/pr/Documents/agm69-resolution-cng2020.pdf](http://www.iata.org/pressroom/pr/Documents/agm69-resolution-cng2020.pdf)>.

<sup>246</sup> See International Air Transport Association, “Improving Environmental Performance”, online: IATA <[www.iata.org/whatwedo/environment/pages/index.aspx](http://www.iata.org/whatwedo/environment/pages/index.aspx)>.

<sup>247</sup> See International Air Transport Association, “IATA Carbon Offset Program”, online: IATA <[www.iata.org/whatwedo/environment/Pages/carbon-offset.aspx](http://www.iata.org/whatwedo/environment/Pages/carbon-offset.aspx)>.

<sup>248</sup> ICAO Council, *Market-Based*, *supra* note 81 at 4. See ICAO, “Offsets for International Aviation Emissions” (August 2012), online: ICAO <[www.icao.int/Meetings/a38/Documents/Offsets%20for%20International%20Aviation%20Emissions.v10.14%20August.pdf](http://www.icao.int/Meetings/a38/Documents/Offsets%20for%20International%20Aviation%20Emissions.v10.14%20August.pdf)>.

<sup>249</sup> See Robin Rix, “Overview of the United Nations offset mechanisms” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished].

Therefore, global mandatory offsetting can be a viable option.

However, as far as assistance to and support for developing States are concerned, global mandatory offsetting with revenue and global emissions trading are preferable to global mandatory offsetting. Because funds generated thereunder would create a revenue stream that could be used to mitigate the environmental impacts of aircraft engine emissions as well as to provide assistance to and support for developing States.<sup>250</sup> Care must be had to the fact that these funds do not wind up in the treasury mingled with general revenue.<sup>251</sup> Consideration of assistance to and support for developing States is crucial, since it has been argued that developed States “must lead in reducing emissions, while developing [States] need support to engage in mitigation actions.”<sup>252</sup> Furthermore, since ICAO’s study on the possible application of the CDM confirmed that it is not possible for emissions from international civil aviation to be accounted for under the CDM,<sup>253</sup> developing States cannot be benefited from CDM projects. Worth mentioning is the fact that CDM is the only measure out of three market-based measures established under the *Kyoto Protocol* that engages developing States and requires developed States to implement emission reduction projects in developing States.<sup>254</sup> As well as reducing emissions, CDM “projects have a key function in transferring technology and capacity to developing countries and contributing to their overall sustainable development.”<sup>255</sup> Therefore, in the absence of CDM projects, any future market-based measure for international civil aviation needs to take account of assistance to and support for

---

<sup>250</sup> See *Report on Market-based Measures*, *supra* note 76 at 7-1.

<sup>251</sup> Airports Council International, Civil Air Navigation Services Organization, International Air Transport Association, International Business Aviation Council, and International Coordinating Council of Aerospace Industries Associations proposed that market-based measures “should not be designed or used to raise general revenues or to suppress demand for air travel.” Airports Council International et al, *supra* note 96, Appendix.

<sup>252</sup> Christiana Figueres, “International air transport and the global effort to address climate change” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 223 at 223.

<sup>253</sup> See ICAO, “Eligibility of civil aviation projects under the Clean Development Mechanism (CDM)” (June 2012), online: ICAO <[www.icao.int/Meetings/a38/Documents/CDM\\_Report.pdf](http://www.icao.int/Meetings/a38/Documents/CDM_Report.pdf)>; ICAO Council, *Market-Based*, *supra* note 81 at 4.

<sup>254</sup> Clean Development Mechanism is “a project-based mechanism involving developed and developing countries. CDM credits are generated from the implementation of emission reduction projects or from afforestation and reforestation projects in developing countries.” ICAO Secretariat, “Economic Instruments: Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 128 at 128. The Clean Development Mechanism (CDM), defined in Article 12 of the Protocol, allows a State “with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing [States]. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of CO<sub>2</sub>, which can be counted towards meeting Kyoto targets.” UNFCCC, “Clean Development Mechanism (CDM)”, online: UNFCCC <[unfccc.int/kyoto\\_protocol/mechanisms/clean\\_development\\_mechanism/items/2718.php](http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php)>.

<sup>255</sup> Howard, *supra* note 211 at 134.

developing States, which can be achieved through the adoption of either global mandatory offsetting with revenue or global emissions trading. Unless the issues of assistance to and support for developing States are addressed under the global mandatory offsetting, such a scheme would not be attractive to developing States. Offsetting projects have to be conducted in developing States and must have the capacity to contribute to the development of the aviation industry of these States to make them capable enough to limit or reduce emissions from their international civil aviation activities. With assistance and support, developing States will be in a better position to combat climate change and global warming.

As well as consideration for developing States, the issue of new entrants has to be addressed. In this regard, provisions for new entrants should be included in any market-based measure “that provides an adjustment for the first few years of operation.”<sup>256</sup> New entrants should not be required to participate in the market-based measure for the first few years of operation, since they need time to grow and become capable of competing against established carriers.<sup>257</sup>

#### **4.3.6.4 Geographic coverage**

Geographic scope of a global market-based measure, i.e. the area of coverage or application of a specific market-based measure, was considered by ICAO as one of the design features of such measures.<sup>258</sup> Three approaches to geographic scope were defined, namely, national airspace, flight information regions, and departing flights.

A national airspace approach to market-based measures would restrict the application of such measures to the sovereign territory of a State, thereby avoiding most questions related to extra-territorial application of such measures.<sup>259</sup> If all States implement market-based measures in their respective sovereign territories, approximately 24 percent of international aviation traffic will

---

<sup>256</sup> Airports Council International et al, *supra* note 96, Appendix.

<sup>257</sup> To learn about the anti-competitive behavior of established carriers toward new entrants to eliminate the latter from the market, see Paul Stephen Dempsey & Laurence E Gesell, *Airline Management: Strategies for the 21st Century*, 2nd ed (Chandler, Ariz: Coast Aire Publications, 2006) ch 14–16.

<sup>258</sup> See ICAO, “Report on Geographic Scope of Market-based Measures (MBMS): Analysis of proposed approaches for the coverage of international aviation emissions under a market-based measure” (July 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/REPORT%20ON%20GEOGRAPHIC%20SCOPE%20OF%20MBMs.pdf](http://www.icao.int/Meetings/a38/Documents/REPORT%20ON%20GEOGRAPHIC%20SCOPE%20OF%20MBMs.pdf)> [ICAO, “Report on Geographic Scope”].

<sup>259</sup> See *ibid* at 4.

be covered.<sup>260</sup> An additional 32 percent of traffic would be covered, resulting in 56 percent coverage in total, “if overflights were included in the calculation”.<sup>261</sup> Nevertheless, unless all States adopt such market-based measures, there could be a risk of carbon leakage since airlines “could route flights to avoid stops in airspace where [market-based measures] are implemented.”<sup>262</sup> Moreover, to avoid the cost of market-based measure, airlines would establish their hubs outside of a State where such measures are implemented that “could increase the level of emissions as a result of airlines flying additional distances”.<sup>263</sup> In theory, “there would be no double counting of emissions using the national airspace approach”.<sup>264</sup>

Flight information regions [FIRs] can extend beyond a national airspace according to the definition provided by Annexes 2 and 11 to the *Chicago Convention*.<sup>265</sup> Annexes 2 and 11 define FIR as “[a]n airspace of defined dimensions within which flight information service and alerting service are provided.”<sup>266</sup> About 344 FIRs provide “air traffic control services which cover 99 per cent of the world”.<sup>267</sup> Under this approach, the geographic scope of market-based measures is established within the boundaries of FIRs.<sup>268</sup> If all States adopt market-based measures within the boundaries of FIRs, under “a continental FIR approach, where oceanic FIRs over the high seas are excluded”, emissions from 90 percent of international traffic would be covered.<sup>269</sup> Exclusion of overflights would reduce the coverage to 40 percent.<sup>270</sup> However, since “a single flight will often cross many FIRs or several State boundaries”, it would be challenging to establish a method of allocating emissions from international civil aviation by adopting an FIR approach “due to the collaboration required between States and the need to divide and account for emissions between

---

<sup>260</sup> See *ibid.* See also ICSA, *Effective*, *supra* note 93 (“limiting [market-based measures] to sovereign airspace leads to unacceptably low coverage of emissions, with a maximum coverage of 22% of international aviation emissions if implemented by all states” at 4).

<sup>261</sup> ICAO, “Report on Geographic Scope”, *supra* note 258 at 4.

<sup>262</sup> *Ibid* at 5.

<sup>263</sup> *Ibid.*

<sup>264</sup> *Ibid.*

<sup>265</sup> *Ibid.*

<sup>266</sup> ICAO, (2005) 10 International Standards: Annex 2 to the Convention on International Civil Aviation: Rules of the Air, at 1-5; ICAO, (2001) 13 International Standards and Recommended Practices: Annex 11 to the Convention on International Civil Aviation: Air Traffic services: Air Traffic Control Service: Flight Information Service: Alerting Service, at 1-7 [*Annex 11*].

<sup>267</sup> ICAO, “Report on Geographic Scope”, *supra* note 258 at 5.

<sup>268</sup> See *ibid.*

<sup>269</sup> *Ibid* at 7.

<sup>270</sup> See *ibid.*

multiple boundaries.”<sup>271</sup> Like with the national airspace approach, a risk of carbon leakage with less than 100 percent coverage exists since aircraft operators could route flights to avoid FIRs subject to market-based measures.<sup>272</sup> Furthermore, more complexities may arise, since FIRs can extend beyond territorial boundaries but States may not have the appropriate legal authority to apply market-based measures outside their sovereign territory.<sup>273</sup>

Concerning the departing flight approach,<sup>274</sup> it was found that such an approach “would capture all international aviation emissions from a flight from its departing point until its first landing, regardless of the airspace in which emissions occur and regardless of the nationality of the aircraft operator.”<sup>275</sup> If all States implement market-based measures, 100 percent of international aviation emissions would be captured under this approach.<sup>276</sup> Nevertheless, in the absence of global application by all States, “the level of emissions captured by the departing flight approach would depend on the international aviation activity within the State adopting” the market-based measure.<sup>277</sup> In the absence of 100 percent participation, there exists a risk of carbon leakage since “flights may create the same, or more, carbon emissions by being routed to areas where no measures are in place.”<sup>278</sup> Since “the emissions from departing flights are calculated only up to the first stopover”, there will not be double counting of emission for any given city pair under this approach.<sup>279</sup>

It appears that the departing flight approach is better than other approaches, though a risk of carbon leakage exists in the absence of global application of any market-based measure. From an environmental perspective, the ICSA preferred the departing flight approach or a “50:50” approach representing 50 percent of arriving flights and 50 percent of departing flights to national airspace approach.<sup>280</sup>

---

<sup>271</sup> *Ibid* at 8.

<sup>272</sup> See *ibid*.

<sup>273</sup> See *ibid*.

<sup>274</sup> Since there is “no commonly agreed definition of a departing flight in the ICAO literature... the following definition was proposed:

*A departing flight is defined as a flight that departs from one State and arrives in another State.” Ibid [emphasis in original].*

<sup>275</sup> *Ibid*.

<sup>276</sup> See *ibid*.

<sup>277</sup> *Ibid*.

<sup>278</sup> *Ibid* at 8–9.

<sup>279</sup> *Ibid* at 8.

<sup>280</sup> See ICSA, *Effective*, *supra* note 93 at 4.



#### **4.3.6.5 Implementation**

After the development phase comes the implementation phase. How should any global market-based measure for aviation be legally implemented to ensure its effectiveness and compliance by most, if not all, States? Market-based measure cannot be implemented through the adoption of a resolution that is a non-binding soft law instrument. For implementation purposes, binding legal measures are essential. This will require either amending the *Chicago Convention* or drafting a new treaty. Both, however, involve be a difficult and time-consuming process. In such circumstances, adopting a new Annex or amending Annex 16 to the *Chicago Convention* may become the last resort.

As discussed above, adopting a new Annex or amending Annex 16 may be an easier, faster, and more flexible process than amending the Convention or drafting a new treaty.<sup>281</sup> Furthermore, Volume II of Annex 16 is considered as one of the multilateral agreements relating to air pollution by the International Law Commission.<sup>282</sup> In current circumstances, it is crucial to ensure the flexibility of the mitigation measures.<sup>283</sup> Hence, ICAO can adopt a market-based measure for all its Contracting States by way of a Standard.<sup>284</sup> A new Annex can be adopted or Annex 16 amended for this purpose.<sup>285</sup> Nevertheless, as mentioned earlier, compliance with the new Annex or the amended Annex 16 by a significant number of economically powerful States is required to ensure the *de facto* hard law status of that legal instrument that will, for reasons noted in the earlier section,<sup>286</sup> persuade other States to comply with that instrument, thereby ensuring their participation in the global market-based measure for international civil aviation. The implementation of market-based measures is further discussed in Chapter 6.<sup>287</sup>

Even if market-based measures are developed and approved to be implemented from 2020, which is unlikely, such measures should not be considered a permanent solution. Market-based measures should be viewed as transitional and temporary measures until other measures, e.g., technology and operational improvements, can provide long-term, permanent solutions to the

---

<sup>281</sup> See Liu, *supra* note 48 at 425.

<sup>282</sup> See ILC, *First Report*, *supra* note 11 at 19.

<sup>283</sup> See Takashi Hongo, “Market-Based Measures: Offset Credits as an Option for “Destination Green”” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 146 at 146.

<sup>284</sup> See de Mestral & Ahmad, *supra* note 33 at 7.

<sup>285</sup> See *ibid.*

<sup>286</sup> See section 4.2, *above*. See also ch 3, *above*.

<sup>287</sup> See ch 6, *below*.

issues of climate change and global warming.<sup>288</sup> For aviation, a variety of options are better.<sup>289</sup> Therefore, ICAO's focus on other measures should continue and ICAO should speed up the process concerning those measures even while developing a global market-based measure for international civil aviation.

#### **4.4 Technology**

Aviation is “a dynamic, advanced-technology, high-value sector [and]...airframe, aero-engine, and aircraft systems manufacturers continuously strive to develop new and innovative technology” to ensure safer flight with reduced environmental impacts.<sup>290</sup> Prospects for climate change and global warming mitigations largely rely on the advancement of technologies:<sup>291</sup> “modernization of aircraft and engine technology will be a key contributor to reducing the environmental footprint of the aviation industry.”<sup>292</sup> Today's commercial aircraft are 70 percent more fuel efficient than the equivalent aircraft produced 40 years ago, and aircraft technology improvement has not stopped;<sup>293</sup> new engine technologies and airframe designs, which will largely reduce emissions, are being introduced.<sup>294</sup>

The work of ICAO's CAEP includes technology. The CAEP's Working Group 3, the principal objective of which is “to keep ICAO engine emissions certification standards [under Annex 16] up to date and effective”, is assigned with the responsibility to assess “advances, within the context of the existing CAEP technology goals, in aircraft and engine design technologies with regard to their impact on fuel burn.”<sup>295</sup> This group has worked on NO<sub>x</sub> standards, mentioned in

---

<sup>288</sup> See Steele, *supra* note 97. See also Airports Council International et al, *supra* note 96 at 3; International Air Transport Association, “Market-Based Measures: IATA Agreement on Carbon Neutral Growth” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 145 (“improvements in technology, operations, and infrastructure will deliver the long-term solutions for aviation's sustainability” at 145).

<sup>289</sup> See Takashi Hongo, “Flexible and Effective measures – Market Base Approach” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished].

<sup>290</sup> Leslie Riegle & Muni Majjigi, “Technology: Pushing the Technology Envelope” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 100 at 100.

<sup>291</sup> See Ribeiro et al, *supra* note 172 at 326.

<sup>292</sup> Riegle & Majjigi, *supra* note 290 at 100.

<sup>293</sup> See Ribeiro et al, *supra* note 172 at 326; Air Transport Action Group, “Facts & Figures”, online: ATAG <[www.atag.org/facts-and-figures.html](http://www.atag.org/facts-and-figures.html)> [ATAG, “Facts”] (visited August 21, 2015).

<sup>294</sup> See Riegle & Majjigi, *supra* note 290 at 100.

<sup>295</sup> ICAO, “WG3: Emissions”, online: ICAO <[www.icao.int/environmental-protection/Documents/CAEP/Images/WG3-Large.png](http://www.icao.int/environmental-protection/Documents/CAEP/Images/WG3-Large.png)> (visited August 6, 2015) [ICAO, “WG3: Emissions”].

the earlier chapter.<sup>296</sup> This working group, in conjunction with other CAEP working groups, is working on ICAO CO<sub>2</sub> aircraft standard and non-volatile particulate matter (PM) certification standard.<sup>297</sup>

Nonetheless, it appears that the technology improvements so far achieved have not elevated aviation technology to that level where aircraft engines will not emit gases which expedite climate change and global warming.<sup>298</sup> Furthermore, there exists no expectation that such level would be attained in the near future, and the aviation industry and aviation-related activities are rapidly growing outpacing technological reductions in emissions.<sup>299</sup> With respect to future advancements, the IPCC fourth assessment report predicts that “[a] 20% improvement over 1997 aircraft efficiency is likely by 2015 and possibly 40 to 50% improvement is anticipated by 2050.”<sup>300</sup> Again, it should be borne in mind that these are all expectations, not guarantees; it is not certain that such technological advancements will definitely occur.

As argued in the previous section, the introduction of new aviation technology, which can ensure, at a minimum, zero growth in emissions, can provide a long-term, permanent solution to problems of emissions from aviation.<sup>301</sup> Nevertheless, there exists no commercially viable aviation technology that can ensure either zero emissions or even zero growth in emissions, and we cannot expect to see drastic technology advances in the near-future to secure that solution since technological improvement, especially in the field of aviation, is a very expensive and time-consuming process.<sup>302</sup>

In civil aviation, technology developments involve “rigorous airworthiness and safety testing” without which these developments do not appear in the marketplace.<sup>303</sup> Compared to other modes of transport, technological development in aviation is more expensive: development in this

---

<sup>296</sup> See ch 3, *above*.

<sup>297</sup> See ICAO, “WG3: Emissions”, *supra* note 295; ICAO, “Technology Standards”, online: ICAO <[www.icao.int/environmental-protection/Pages/technology-standards.aspx](http://www.icao.int/environmental-protection/Pages/technology-standards.aspx)>.

<sup>298</sup> See generally Ribeiro et al, *supra* note 172 at 353–54.

<sup>299</sup> See e.g. Dempsey, *supra* note 17 at 413–14; ICAO Secretariat, “Aviation Outlook Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 18 at 18.

<sup>300</sup> Ribeiro et al, *supra* note 172 at 326. See also Barker et al, *supra* note 214 at 51; ATAG, “Facts”, *supra* note 293.

<sup>301</sup> See section 4.3, *above*.

<sup>302</sup> Barker et al, *supra* note 214 at 36, states that “[t]echnological change is particularly important over the long-term time scales characteristic of climate change. Decade or century-long time scales are typical for the lags involved between technological innovation and widespread diffusion and of the capital turnover rates characteristic of long-lived energy capital stock and infrastructures.”

<sup>303</sup> Ribeiro et al, *supra* note 172 at 353.

sector needs to satisfy more rigorous engine emissions standards, aircraft noise standards, and requirements than other sectors; development is required to deliver “products that allow aircraft to remain commercially viable for three decades or more”; and the norm is “a level of engineering excellence beyond that demanded for other vehicles”.<sup>304</sup> Compared to other modes of transport, technological improvement in civil aviation is more time-consuming due to “engineering and safety standards that apply, along with exacting weight minimisation, reliability and maintainability requirements”.<sup>305</sup> Additionally, the fact that new technology does not always work as designed lengthens the improvement process.<sup>306</sup> It takes a long time for any new technology to develop into a proven technology. This is equally true for aviation. Most new commercial aircraft experience problems after their launch;<sup>307</sup> “[t]he introduction of new technologies and new material can lead to problems within months of an aircraft beginning airline service.”<sup>308</sup> An example of the occasional catastrophic failure of new technology is the British Comet “whose fuselage split because of metal fatigue caused by pressurization and depressurization”.<sup>309</sup> In recent times, numerous examples of failure of new technology are available concerning commercial jets with latest, innovative technology. For example, both the Boeing 787 Dreamliner and Airbus A380, the two large, fuel-efficient, and environment-friendly commercial aircraft presently in service,<sup>310</sup> encountered a series of setbacks after their introduction.<sup>311</sup>

---

<sup>304</sup> *Ibid.*

<sup>305</sup> *Ibid.*

<sup>306</sup> See Dempsey & Gesell, *supra* note 257 at 314.

<sup>307</sup> See Katia Hetter & Aaron Cooper, “Dreamliner’s growing pains not unusual for new airplanes, experts say”, *CNN Travel* (10 January 2013), online: CNN <[www.cnn.com/2013/01/09/travel/dreamliner-problems/index.html?iref=allsearch](http://www.cnn.com/2013/01/09/travel/dreamliner-problems/index.html?iref=allsearch)>.

<sup>308</sup> Rob Corp, “Dreamliner trouble: A brief history of airliner problems”, *BBC News* (17 January 2013), online: BBC News <[www.bbc.co.uk/news/uk-21059525](http://www.bbc.co.uk/news/uk-21059525)>.

<sup>309</sup> Dempsey & Gesell, *supra* note 257 at 314.

<sup>310</sup> To learn about Boeing 787 Dreamliner, see Boeing, “787”, online: Boeing <[www.boeing.com/commercial/787/](http://www.boeing.com/commercial/787/)> (visited August 8, 2015). To learn about Airbus A380, see Airbus, “A380”, online: Airbus <[www.airbus.com/aircraftfamilies/passengeraircraft/a380family/](http://www.airbus.com/aircraftfamilies/passengeraircraft/a380family/)> (visited August 8, 2015).

<sup>311</sup> See e.g. “Japan Airlines review finds fuel leak from 787”, *CNN Travel* (14 January 2013), online: CNN <[www.cnn.com/2013/01/13/travel/dreamliner-problems/index.html](http://www.cnn.com/2013/01/13/travel/dreamliner-problems/index.html)>; “Boeing Dreamliner makes emergency landing during test flight”, *CNN* (9 November 2010), online: CNN <[www.cnn.com/2010/US/11/09/boeing.dreamliner.emergency/index.html](http://www.cnn.com/2010/US/11/09/boeing.dreamliner.emergency/index.html)>; Jim Barnett, “Investigators find cracks in second Dreamliner engine”, *CNN Travel* (29 September 2012), online: CNN <[www.cnn.com/2012/09/28/travel/dreamliner-engine/index.html](http://www.cnn.com/2012/09/28/travel/dreamliner-engine/index.html)>; Todd Sperry, “United 787 Dreamliner diverts due to mechanical issue”, *CNN Travel* (6 December 2012), online: CNN <[www.cnn.com/2012/12/04/travel/dreamliner-diversion/index.html](http://www.cnn.com/2012/12/04/travel/dreamliner-diversion/index.html)>; Bettina Wassener, “More Problems for Boeing’s 787 Surface in Japan”, *The New York Times* (11 January 2013), online: The New York Times <[www.nytimes.com/2013/01/12/business/global/cracks-appear-in-cockpit-window-of-boeing-787.html](http://www.nytimes.com/2013/01/12/business/global/cracks-appear-in-cockpit-window-of-boeing-787.html)>; Aaron Cooper, “Dreamliners grounded globally due to fire risk”, *CNN Travel* (17 January 2013), online: CNN

As demonstrated in the earlier section, the current state of technology will fail to achieve a drastic reduction in emissions from aviation and carbon neutral growth from 2020 without, *inter alia*, a global market-based measure.<sup>312</sup> According to the independent experts nominated by various CAEP members and observers, the 2020 goal of achieving carbon neutral growth “would be met if an aircraft at maximum payload maximum range achieves a reduction in excess of between 29% and 25%...with the former anchoring the band for the [Single Aisle] and the latter for the [Small Twin Aisle]...relative to baseline aircraft of 2000.”<sup>313</sup> However, whether or not such reductions would be achieved is uncertain. In such circumstances, it will not be a pragmatic decision to wait for the technology to develop and, hence, to allow the further degradation of our climate system.<sup>314</sup>

---

<[www.cnn.com/2013/01/17/travel/dreamliner-faa/index.html](http://www.cnn.com/2013/01/17/travel/dreamliner-faa/index.html)>; Aaron Cooper, “Fire aboard empty 787 Dreamliner prompts investigation”, *CNN Travel* (8 January 2013), online: CNN <[www.cnn.com/2013/01/07/travel/dreamliner-fire/index.html](http://www.cnn.com/2013/01/07/travel/dreamliner-fire/index.html)>; Jim Barnett, “Airline: Dreamliner fuel leak due to an open valve”, *CNN Travel* (9 January 2013), online: CNN <[www.cnn.com/2013/01/08/travel/dreamliner-fuel-leak/index.html](http://www.cnn.com/2013/01/08/travel/dreamliner-fuel-leak/index.html)>; Jim Barnett, “Japanese airlines suspend Dreamliner flights after emergency landing”, *CNN Travel* (16 January 2013), online: CNN <[www.cnn.com/2013/01/15/travel/japan-dreamliner-emergency-landing/index.html](http://www.cnn.com/2013/01/15/travel/japan-dreamliner-emergency-landing/index.html)>; Michael Martinez & Thom Patterson, “Fire, ‘technical issue’ on two Dreamliners raise new worries”, *CNN* (13 July 2013), online: CNN <[www.cnn.com/2013/07/12/world/europe/uk-heathrow-airplane-fire/index.html](http://www.cnn.com/2013/07/12/world/europe/uk-heathrow-airplane-fire/index.html)>; Santanu Choudhury, “Air India’s Dreamliner Nightmare”, *The Wall Street Journal [India]* (6 November 2013), online: The Wall Street Journal <[blogs.wsj.com/indiarealtime/2013/11/06/air-indias-dreamliner-nightmare/](http://blogs.wsj.com/indiarealtime/2013/11/06/air-indias-dreamliner-nightmare/)>; “Boeing: 15 airlines warned over high-altitude ice”, *BBC News* (23 November 2013), online: BBC News <[www.bbc.co.uk/news/business-25068222](http://www.bbc.co.uk/news/business-25068222)>; “Q&A: A380 delays”, *BBC News* (30 October 2006), online: BBC News <[news.bbc.co.uk/2/hi/business/5405524.stm](http://news.bbc.co.uk/2/hi/business/5405524.stm)>; “Singapore Air grounds A380 again for pump fault”, *Reuters* (26 March 2008), online: Reuters <[www.reuters.com/article/2008/03/26/singapore-airlines-a-idUSSIN11028220080326](http://www.reuters.com/article/2008/03/26/singapore-airlines-a-idUSSIN11028220080326)>; “Qantas grounds Airbus A380 fleet after mid-air engine failure”, *CNN* (4 November 2010), online: CNN <[edition.cnn.com/2010/WORLD/asiapcf/11/04/indonesia.plane.emergency/index.html](http://edition.cnn.com/2010/WORLD/asiapcf/11/04/indonesia.plane.emergency/index.html)>; “Airbus asks airlines to inspect A380 engines”, *Reuters* (5 November 2010), online: Reuters <[www.reuters.com/article/2010/11/05/us-airbus-idUSTRE6A41DH20101105](http://www.reuters.com/article/2010/11/05/us-airbus-idUSTRE6A41DH20101105)>; Tim Hepher, “Factory, design flaws caused A380 cracks”, *Reuters* (27 January 2012), online: Reuters <[www.reuters.com/article/2012/01/27/uk-airbus-a-idUSLNE80N02R20120127](http://www.reuters.com/article/2012/01/27/uk-airbus-a-idUSLNE80N02R20120127)>; “Airbus confirms more A380 cracks, announces fix”, *Reuters* (25 January 2012), online: Reuters <[www.reuters.com/article/2012/01/25/us-airbus-a-idUSTRE80O1YX20120125](http://www.reuters.com/article/2012/01/25/us-airbus-a-idUSTRE80O1YX20120125)>; “Singapore Airlines A380 plane in emergency landing”, *BBC News Business* (6 January 2014), online: BBC News <[www.bbc.co.uk/news/business-25618122](http://www.bbc.co.uk/news/business-25618122)>.

<sup>312</sup> See section 4.3, *above*.

<sup>313</sup> Lourdes Maurice, “Technology: ICAO Goals for Aviation Fuel Burn Reduction from Technology” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 103 at 103, 107.

<sup>314</sup> See Ribeiro et al, *supra* note 172 (“without policy intervention, projected annual improvements in aircraft fuel efficiency of the order of 1–2%, will be surpassed by annual traffic growth of around 5% each year, leading to an annual increase of CO<sub>2</sub> emissions of 3–4% per year” at 326).

## **4.5 Operational opportunities and legal hurdles\***

### **4.5.1 The importance of operational improvements to reduce aviation emissions**

Operational improvements are another important technical measures included in the basket that can reduce emissions from international civil aviation.<sup>315</sup> With improved operational measures, fuel consumption will be reduced and, hence, emissions from aviation abated. According to ICAO, “operational opportunities to reduce emissions represent a double win-win solution.”<sup>316</sup> Because, first, operational improvements minimize the amount of fuel used in servicing and operating each flight leading to reduced fuel consumption and, consequently, to reduced fuel costs; and, second, such improvements do not “necessarily require the introduction of new equipment or the deployment of expensive technologies” but “different ways of operating aircraft that are already in service.”<sup>317</sup> It is true that operational improvements cannot reduce emissions to the level necessary to significantly decrease aviation’s contribution to climate change and global warming (also shown in Figure 1 above). Nonetheless, this mitigation measure should not be overlooked since no single measure alone can effectively combat climate change and global warming. Again, it is worth noting that, for every ton of fuel reduced, 3.157 tons of CO<sub>2</sub> are avoided.<sup>318</sup> Therefore, improvements in operations should continue, and new concepts for the purpose of improving operations should continue to be developed.

The argument that improvements in operational measures can reduce hazardous emissions from aviation is not a mere theoretical concept; this is a proven and practical concept. Environmental studies conducted after the implementation of one of the mechanisms to improve operational efficiency, namely Reduced Vertical Separation Minimum [RVSM], in various ICAO Regions found that the implementation of such mechanism led to “significant environmental

---

\* Section 4.5 includes excerpts from author’s following article written with P Paul Fitzgerald: “Efficient Air Traffic Management: A Precondition for Reducing Hazardous Emissions from Aviation: Is Sovereignty Getting in the Way of Progress?” (2014) 63:3 ZLW 386.

<sup>315</sup> See ICAO Secretariat, “Overview: Global”, *supra* note 75 (“[o]perational measures are among the elements in the basket of [mitigation] measures available to States to address the impact of aviation on the environment” at 96).

<sup>316</sup> ICAO, “Operational Measures”, online: ICAO <[www.icao.int/environmental-protection/Pages/operational-measures.aspx](http://www.icao.int/environmental-protection/Pages/operational-measures.aspx)> [ICAO, “Operational Measures”].

<sup>317</sup> *Ibid.*

<sup>318</sup> CO<sub>2</sub> emissions are 3.157 times the mass of fuel burned. See ICAO, *ICAO Carbon Emissions Calculator Methodology*, 7th version (June 2014), online: ICAO <[www.icao.int/environmental-protection/CarbonOffset/Documents/Methodology%20ICAO%20Carbon%20Calculator\\_v7-2014.pdf](http://www.icao.int/environmental-protection/CarbonOffset/Documents/Methodology%20ICAO%20Carbon%20Calculator_v7-2014.pdf)>; ICAO Secretariat, “Overview: Global”, *supra* note 75 at 96; Christian N Jardine, “A Methodology For Offsetting Aviation Emissions”, University of Oxford Environmental Change Institute (April 2007) at 4, online: University of Oxford <[www.eci.ox.ac.uk/research/energy/downloads/aviation-climatecare.pdf](http://www.eci.ox.ac.uk/research/energy/downloads/aviation-climatecare.pdf)>.

benefits”: total fuel burn, NO<sub>x</sub> emissions, CO<sub>2</sub> emissions, and water vapor (H<sub>2</sub>O) emissions were all reduced.<sup>319</sup> The outcomes of another mechanism, namely Performance-based Navigation [PBN], in the ICAO South American Region, the US, and Canada were similar. In the South American region, the result was “an increase in productivity and quality of elaboration of procedures and translated into time reduction and distance covered, and therefore the reduction of CO<sub>2</sub> emissions.”<sup>320</sup> In the US and Canada, the implementation of PBN in different regions and under the Windsor-Toronto-Montreal (WTM) Airspace Redesign – Project,<sup>321</sup> respectively, resulted in huge amount of fuel savings and, consequently, CO<sub>2</sub> savings.<sup>322</sup>

#### **4.5.2 The present state of operational improvements**

In the context of aviation, the term “operations” “can be used to describe a broad range of activities including: the flying of the airplane, the control and/or monitoring of the aircraft by the air traffic management system, and the conduct of various airport activities.”<sup>323</sup> ICAO has been persistently working to facilitate operational improvements in various ways. For example, ICAO, in close conjunction with IATA and CANSO, introduced a new aviation system flight plan in November 2012, which will assist “aviation to more efficiently manage growing air traffic

---

<sup>319</sup> ICAO Secretariat, “ICAO’s Global Air Traffic Management (ATM): Operational Concept and Global Air Navigation Plan” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 98 at 100 [ICAO Secretariat, “ICAO’s Global Air Traffic Management”].

<sup>320</sup> Celso Figueiredo, “PBN Operational Implementation: *Performance Based Navigation (PBN) in the SAM Region*” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

<sup>321</sup> The Project includes Windsor-Montreal Corridor, the busiest corridor in Canada, and Toronto Pearson Airport, the busiest airport in Canada and 18<sup>th</sup> busiest in the world. See Jeff Cochrane, “Canadian PBN Implementation” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

<sup>322</sup> In the US, the implementation of PBN resulted in 2.3M – 5.6M gallons of fuel and 23K – 56K metric tons of CO<sub>2</sub> savings annually in Northern California, 3.4M – 7.8M gallons of fuel and 34K – 78K metric tons of CO<sub>2</sub> savings annually in Southern California, 2.5M – 7.5M gallons of fuel and 25K – 75K metric tons of CO<sub>2</sub> savings annually in Washington DC, 4.1M – 8.6M gallons of fuel and 41K – 86K metric tons of CO<sub>2</sub> annual savings in North Texas, 2.9M – 7.7M gallons of fuel and 30K – 78K metric tons of CO<sub>2</sub> savings annually in Atlanta, 3.7M – 6.2M gallons of fuel and 35K – 59K metric tons of CO<sub>2</sub> savings annually in Charlotte, and 3.0M – 8.6M gallons of fuel and 31K – 87K metric tons of CO<sub>2</sub> savings annually in Houston. See Elizabeth L Ray, “The PBN Toolbox: Building the Performance Based National Airspace System” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished]. In Canada, due to the implementation of PBN under the Windsor-Toronto-Montreal (WTM) Airspace Redesign – Project, 5,441,569 liters of fuel and 4,307 metric tons of CO<sub>2</sub>-equivalent greenhouse gas emissions were avoided annually with respect only to Westbound landing. See Cochrane, *supra* note 321.

<sup>323</sup> ICAO, “Operational Measures”, *supra* note 316.

volumes and related capacity challenges while reducing its CO<sub>2</sub> emissions.”<sup>324</sup> The new flight plan would enable flight crews and air traffic controllers to optimize routes and diminish flight times as well as reduce noise and emissions.<sup>325</sup> “[I]n order to provide States and other stakeholders with information on a state-of-the-art variety of measures and best practices to reduce aviation emissions, ranging from weight reduction, to airport operations, as well as other operational improvements”, ICAO’s CAEP developed and updated the guidance material on operational opportunities to minimize fuel consumption and emissions.<sup>326</sup> Additional guidance material on conducting communications, navigation, surveillance, and air traffic management [CNS/ATM] environmental assessment was also developed by the CAEP, and endorsed by the ICAO Council.<sup>327</sup> ICAO publishes and updates the Global Air Navigation Plan [GANP] which is “an overarching framework that includes key civil aviation policy principles to assist ICAO Regions, sub-regions and States with the preparation of their Regional and State air navigation plans.”<sup>328</sup>

---

<sup>324</sup> ICAO, Press Release, COM 19/12, “Aviation Groups Unite to Achieve Instantaneous Global System Upgrade” (15 November 2012), online: ICAO <[www.icao.int/Newsroom/Pages/aviation-groups-unite-to-achieve-instantaneous-global-system-upgrade.aspx](http://www.icao.int/Newsroom/Pages/aviation-groups-unite-to-achieve-instantaneous-global-system-upgrade.aspx)>.

<sup>325</sup> See *ibid.* A special coordination center at ICAO Headquarters in Montreal, Canada was established on November 12, 2012, to “help monitor and manage the transition to the new flight plan format”. However, “[t]actical responsibilities relating to the new flight plan transition resided with the air navigation service providers who manage the world’s over 80,000 daily flights.” *Ibid.*

<sup>326</sup> ICAO Secretariat, “Overview: Global”, *supra* note 75 at 96–97. To view the updated operational manual, see ICAO, *Operational Opportunities to Reduce Fuel Burn and Emissions*, Circular 303-AN/176, ICAO Doc 10013 (2014). The new operational manual “contains information on current operational practices being implemented by aircraft operators, airport operators, air navigation service providers (ANSPs), other industry organizations and ICAO Member States.” It also includes “information on airport operations, maintenance, weight reduction, the effect of payload on fuel efficiency, air traffic management, flight and route planning, and other aircraft operations.” ICAO Secretariat, “Operations: Operational Improvements to Reduce Global Emissions” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 112 at 112 [ICAO Secretariat, “Operations: Operational Improvements”].

<sup>327</sup> See ICAO Secretariat, “Overview: Global”, *supra* note 75 at 97. The CNS/ATM environmental assessment guidance material “focuses on environmental impact assessments (including both engine emissions and noise), related to proposed changes to operational procedures, airspace re-designs, and other related operational aspects.” ICAO Secretariat, “Operations: Operational Improvements”, *supra* note 326 at 112. ICAO has stressed to States that early implementation of new CNS/ATM systems “would be an effective means of reducing fuel burn and avoiding unnecessary emissions. The results of a preliminary study of the environmental benefits associated with CNS/ATM and the methodology for their assessment have been incorporated into the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750).” ICAO, “Operational Measures”, *supra* note 316.

<sup>328</sup> ICAO, *Global Air Navigation Plan*, 4th ed, ICAO Doc 9750-AN/963 (Montreal: ICAO, 2013) at 15, online: ICAO <[www.icao.int/publications/Documents/9750\\_4ed\\_en.pdf](http://www.icao.int/publications/Documents/9750_4ed_en.pdf)> [ICAO, *Global Air Navigation*]. The GANP’s objective is “to increase capacity and improve efficiency of the global civil aviation system whilst improving or at least maintain safety. The GANP also includes strategies for addressing the other ICAO Strategic Objectives.” The Plan “outlines ICAO’s ten key civil aviation policy principles guiding global, regional and State air navigation planning.” These 10 principles are: commitment to the implementation of ICAO’s strategic objectives and key performance areas; aviation safety is the highest priority; tiered approach to air navigation planning; global air traffic management operational concept; global air navigation priorities; regional and State air navigation priorities;



The fourth edition of the GANP is “designed to guide complementary and sector-wide air transport progress over 2013-2028 and is approved triennially by the ICAO Council.”<sup>329</sup> Furthermore, ICAO continues to develop and make available new tools to enable States to evaluate “the environmental impacts of aviation operations”.<sup>330</sup> Recently, ICAO has developed the Aviation System Block Upgrade [ASBU]. In order to measure its environmental benefits, the “CAEP, in partnership with the operational community, is in the process of assessing the first modules of” the ASBU.<sup>331</sup>

The development of the ASBU concept by ICAO is an admirable step in this regard. The concept has been developed in collaboration with States, industry, and international organizations to meet the real challenge for the aviation community to achieve “safety and operational improvements on a globally harmonized basis, while being environmentally responsible and cost-effective.”<sup>332</sup> In practice, “[a] key challenge for the aviation community in recent years has been to prioritize and build consensus around the latest technologies, procedures and operational concepts...[since] a wide variety of national and regional [air traffic management] modernization programmes have been emerging worldwide.”<sup>333</sup> ASBU aims to ensure at reasonable cost that:

- aviation safety is maintained and enhanced;
- air traffic management improvement programs are effectively harmonized; and
- barriers to future aviation efficiency and environmental gains are removed.<sup>334</sup>

The ASBU “concept allows for a flexible global systems approach, enabling all States to advance

---

ASBUs, modules and roadmaps; use of ASBU blocks and modules; cost benefit and financial issues; and review and evaluation of air navigation planning. *Ibid* at 15, 17–19.

<sup>329</sup> *Ibid* at 4. The GANP “represents a rolling, 15-year strategic methodology which leverages existing technologies and anticipates future developments based on State/industry agreed operational objectives.” The Block Upgrades under the GANP are “organized in five-year time increments starting in 2013 and continuing through 2028 and beyond. This structured approach provides a basis for sound investment strategies and will generate commitment from States, equipment manufacturers, operators and service providers.” *Ibid*.

<sup>330</sup> ICAO Secretariat, “Overview: Global”, *supra* note 75 at 97. For example, “ICAO recently launched the ICAO Fuel Savings Estimation Tool (IFSET), which was developed to assist States to estimate the fuel savings and corresponding environmental benefits from the implementation of operational improvements”. *Ibid*.

<sup>331</sup> *Ibid*.

<sup>332</sup> ICAO Secretariat, “Operations: ICAO Block Upgrades Minimizing Adverse Environmental Effects of Civil Aviation Activities” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 114 at 114 [ICAO Secretariat, “Operations: ICAO Block Upgrades”].

<sup>333</sup> ICAO Secretariat, “Operations: Operational Improvements”, *supra* note 326 at 113 (“[t]he multidisciplinary and interrelated aspects of these modernization efforts require ongoing collaboration among stakeholders representing every aspect and component of the international air transport system”).

<sup>334</sup> See ICAO Secretariat, “Operations: ICAO Block Upgrades”, *supra* note 332 at 114. See also ICAO Secretariat, “Operations: Operational Improvements”, *supra* note 326 (ASBU “forms a critical element of the implementation planning mechanism of ICAO’s Global Air Navigation Plan” at 113).

their Air Navigation capabilities based on their specific operational requirements.”<sup>335</sup> ICAO GANP includes ASBU “framework, its modules and its associated technology roadmaps covering *inter alia* communications, surveillance, navigation, information management and avionics.”<sup>336</sup>

At the heart of the ASBU concept is a system of modules.<sup>337</sup> Each module is “comprised of technologies and procedures that are organized towards achieving a specific performance capability. Each of these modules is then linked to one of four specific and interrelated performance improvement areas”.<sup>338</sup> These four areas are: airport operations, globally interoperable systems and data, optimum capacity and flexible flights, and efficient flight paths.<sup>339</sup> These modules apply several other concepts that include continuous descent operations [CDOs], continuous climb operations [CCOs], collaborative decision making to improve airport operations [A-CDM], and PBN.<sup>340</sup>

CDOs feature optimized profiles that permit “aircraft to descend from high altitudes to the airport at minimum thrust settings, thus decreasing noise in local communities and using up to 30% less fuel than standard “stepped” approaches.”<sup>341</sup> CCOs, which do not require a particular air or ground technology and are derived from existing aircraft operating techniques assisted by “the appropriate airspace and procedure design”, enable “an aircraft to reach and maintain its optimum flight level without interruption” thereby optimizing fuel efficiency and reducing emissions.<sup>342</sup> The implementation of CDO and CCO will largely save fuel since large amount of fuel burn occurs during the landing and take-off [LTO] cycle.<sup>343</sup> A-CDM aims to improve surface traffic management, “leading to reduced delays on movement and maneuvering areas” and, hence, contributes to reduced fuel burn and emissions of gases.<sup>344</sup> Modules regarding A-CDM provide for “the implementation of a collaborative set of applications and permit the sharing of surface operations data among the different operators at the airport.”<sup>345</sup>

---

<sup>335</sup> ICAO Secretariat, “Operations: ICAO Block Upgrades”, *supra* note 332 at 114.

<sup>336</sup> ICAO, *Global Air Navigation*, *supra* note 328 at 15 [emphasis added].

<sup>337</sup> See ICAO Secretariat, “Operations: ICAO Block Upgrades”, *supra* note 332 at 114 (according to ICAO, the system is “pragmatic”).

<sup>338</sup> *Ibid.*

<sup>339</sup> See *ibid.*

<sup>340</sup> See *ibid.*

<sup>341</sup> *Ibid* at 115.

<sup>342</sup> *Ibid.*

<sup>343</sup> See *ibid* at 114.

<sup>344</sup> *Ibid* at 115.

<sup>345</sup> *Ibid.*

Among these concepts applied by the modules, Performance-based Navigation [PBN] is crucial, since PBN is key to the implementation of ASBU and is an enabler for CDO and CCO.<sup>346</sup> PBN permits “aircraft to fly even closer to their preferred 4D trajectory.”<sup>347</sup> Because, “[d]eveloped after the improvement of the air navigation system in the vertical plane, PBN improves the efficiency in the horizontal plane.”<sup>348</sup> ICAO defines PBN as “[a]rea navigation based on performance requirements for aircraft operating along an [air traffic service] route, on an instrument approach procedure or in a designated airspace” where “[p]erformance requirements are expressed in navigation specifications in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.”<sup>349</sup> PBN provides the methods “for flexible routes and terminal procedures” by applying Area Navigation [RNAV],<sup>350</sup> and Required Navigation Performance [RNP]<sup>351</sup> specifications.<sup>352</sup> The concept of PBN “represents a shift from sensor-based to performance-based navigation.”<sup>353</sup> Under this concept, “generic navigation requirements are defined based on operational requirements.”<sup>354</sup> Operators then assess options with respect to available technology and navigation services that “could allow the requirements to be met.”<sup>355</sup> Thus, PBN grants operators discretion to choose “a more cost-effective option, rather than a solution being imposed as part of the operational requirements.”<sup>356</sup>

Although it is now proven, as demonstrated above, that the implementation of PBN can

---

<sup>346</sup> See ICAO, “PBN iKit”, online: ICAO <[www.icao.int/safety/pbn/PBNiKitV3/story.html](http://www.icao.int/safety/pbn/PBNiKitV3/story.html)>.

<sup>347</sup> ICAO Secretariat, “ICAO’s Global Air Traffic Management”, *supra* note 319 at 100.

<sup>348</sup> *Ibid.*

<sup>349</sup> ICAO, *Performance-based Navigation (PBN) Manual*, 3rd ed, ICAO Doc 9613/AN/937 (Montreal: ICAO, 2008) at I-(xx) [ICAO, *PBN Manual*]; *Annex 11*, *supra* note 266 at 1-10.

<sup>350</sup> RNAV is “[a] method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.” ICAO, *PBN Manual*, *supra* note 349 at I-(xix).

<sup>351</sup> RNP system is “[a]n area navigation system which supports on-board performance monitoring and alerting.” *Ibid* at I-(xx).

<sup>352</sup> ICAO, “Performance Based Navigation: Overview”, online: ICAO <[www.icao.int/safety/pbn/Pages/Overview.aspx](http://www.icao.int/safety/pbn/Pages/Overview.aspx)>. The two systems, namely RNAV and RNP, are “fundamentally similar.” However, the key difference is “the requirement for on-board performance monitoring and alerting.” A navigation specification which “includes a requirement for on-board navigation performance monitoring and alerting is referred to as an RNP specification. One not having such requirements is referred to as an RNAV specification. An area navigation system capable of achieving the performance requirement of an RNP specification is referred to as an RNP system.” ICAO, *PBN Manual*, *supra* note 349 at I-(v).

<sup>353</sup> ICAO, *PBN Manual*, *supra* note 349 at I-(iii).

<sup>354</sup> *Ibid.*

<sup>355</sup> *Ibid.*

<sup>356</sup> *Ibid.*

reduce fuel usage and, consequently, emissions from aviation in large amount, PBN suffers from various difficulties. A few of these difficulties are: a long and difficult implementation process;<sup>357</sup> a lack of recognition that PBN matters;<sup>358</sup> a lack of global expertise;<sup>359</sup> difficulty understanding the PBN Manual<sup>360</sup> due to technical incompetence and language barrier;<sup>361</sup> misconceptions of the system;<sup>362</sup> shortcomings in co-ordination between stakeholders;<sup>363</sup> confusion of States over terrestrial aid requirements;<sup>364</sup> current navigation specifications not basing on actual performance data;<sup>365</sup> lack of standardization;<sup>366</sup> few older aircraft equipped for PBN;<sup>367</sup> a lack of PBN procedures at some airports;<sup>368</sup> the difficulty of PBN-capable aircraft to fit in with non-PBN capable aircraft on same flight tracks;<sup>369</sup> and non-receipt of best possible cost benefit by airlines.<sup>370</sup> Those difficulties need to be overcome to obtain full environmental benefit from the application of PBN since Aviation System Block Upgrade [ASBU] cannot be implemented without PBN thus frustrating the ICAO Global Air Navigation Plan [GANP].

The ICAO GANP “outlines implementation issues involving the near-term” PBN.<sup>371</sup>

---

<sup>357</sup> See e.g. Shane Sumner, “Regional Forum: “Creating More Lift”: ICAO Asia/Pacific Region” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished]; Alan Stealey, Address (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished]; Carlos Cirilo, “PBN: Global Implementation Situation” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

<sup>358</sup> See e.g. Stealey, *supra* note 357.

<sup>359</sup> See e.g. Cirilo, *supra* note 357; Stealey, *supra* note 357; Michael S Lewis, “PBN – A Commercial Data and Service Provider Perspective – Are we ready to go?” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

<sup>360</sup> ICAO, *PBN Manual*, *supra* note 349.

<sup>361</sup> See e.g. Sumner, *supra* note 357.

<sup>362</sup> See e.g. Cirilo, *supra* note 357; Stealey, *supra* note 357.

<sup>363</sup> See e.g. *ibid.*

<sup>364</sup> See e.g. Sumner, *supra* note 357.

<sup>365</sup> See e.g. *ibid.*

<sup>366</sup> See e.g. Benoît Roturier, “RNP Approaches” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

<sup>367</sup> See e.g. Angela Gittens, “Airports and PBN, will it make a difference?” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished]; Pierre Alibert Marchi, “PBN and Regional Aircraft: Legacy, turboprop and regional issues” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished]; Randy Walter, “GE Aviation Systems: PBN Avionics Implementation and Certification” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

<sup>368</sup> See e.g. Gittens, *supra* note 367.

<sup>369</sup> See e.g. *ibid.*

<sup>370</sup> See e.g. Sumner, *supra* note 357.

<sup>371</sup> ICAO, *Global Air Navigation*, *supra* note 328 at 5.

Though better training and collaboration between States can help overcome some of these difficulties, PBN-capable technology and assistance to States are crucial in this regard.<sup>372</sup> Some economically weak States cannot afford either to replace their older aircraft with PBN-capable new aircraft or even to equip their older aircraft for PBN. Unless they have PBN-capable aircraft, States having PBN-capable aircraft will continue to encounter difficulty to fit in with non-PBN capable aircraft on same flight tracks. To garner the full environmental benefit from the application of PBN, all States must have PBN-capable aircraft. The introduction of a global market-based measure for international civil aviation can be a solution with regard to assistance to States since revenues generated through that measure can be used to assist those economically weak States.

### **4.5.3 Sovereignty, restricted airspace, and operational improvements**

#### **4.5.3.1 The issue**

One of the ways for airlines to reduce emissions by improving operational practices is to fly more direct routings.<sup>373</sup> The concept of State sovereignty appears to be a stumbling block in this respect; “commercial airlines often are forced to fly less-than-direct routes in order to avoid military or restricted airspace”<sup>374</sup> that are established by States under Article 9 of the *Chicago Convention*.<sup>375</sup> Article 1 of the *Chicago Convention*, which has codified the customary international law principle of airspace sovereignty,<sup>376</sup> provides that each State has “complete and

---

<sup>372</sup> See also Lee Merry Brown, “Operations: Impact of Operational Changes on Global Emission Levels — Findings of the Operational Goals Group” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 119 at 121.

<sup>373</sup> See e.g. P Paul Fitzgerald, “Europe’s Emissions Trading System: Questioning its Raison d’Etre” (2011) 10 *Issues in Aviation L & Policy* 189 at 216 (HeinOnline). Fitzgerald, *ibid* at 215, states:

[T]here are five ways for an airline to reduce emissions:

1. Fly a more fuel-efficient aircraft;
2. Reduce aircraft weight;
3. Fly more direct routings;
4. Fly fewer flights but with larger aircraft; or
5. Fly less.

Barker et al, *supra* note 214 at 51, note that “[a]ircraft operations can be optimized for energy use (with minimum CO<sub>2</sub> emissions) by minimizing taxiing time, flying at optimal cruise altitudes, flying minimum-distance great-circle routes, and minimizing holding and stacking around airports. The [greenhouse gas reduction] potential of such strategies has been estimated at 6–12%.”

<sup>374</sup> Fitzgerald, *supra* note 373 at 216.

<sup>375</sup> See *Chicago Convention*, *supra* note 42, art 9.

<sup>376</sup> See e.g. *Air Transport Association of America and others v Secretary of State for Energy and Climate Change*, C-366/10, [2011] ECR I-13833 at I-13885–I-13886; Brownlie, *supra* note 34 at 105.

exclusive sovereignty over the airspace above its territory.”<sup>377</sup> According to Article 68, Contracting States to the Convention have the right to designate the international air routes and airports in their territory,<sup>378</sup> and, according to Annex 11, these States must determine, *inter alia*, those portions of the airspace over their territories where air traffic services will be provided.<sup>379</sup> In recognition of State sovereignty, Article 9 of the Convention authorizes Contracting States to uniformly restrict or prohibit national and foreign aircraft engaged in international scheduled airline services from flying over certain areas of its territory for military or public safety reasons.<sup>380</sup> Aircraft entering the restricted or prohibited areas may be required to promptly land at some designated airport within the State’s territory.<sup>381</sup> Commercial flights must avoid those restricted or prohibited airspace to avoid forced landing and, hence, these flights often have to choose indirect or less-than-direct routings.<sup>382</sup> In practical terms, during the Cold War, “the need to avoid Russian restricted airspace resulted in indirect routings that made non-stop U.S.-China services commercially unviable and required en-route stops in Anchorage or Japan.”<sup>383</sup>

In order to enjoy maximum benefit out of operational improvements, States should either reduce the size of or grant civil aircraft additional access to those restricted areas or prohibited airspace at least during peak hours.<sup>384</sup> In this regard, greater cooperation and coordination between civil and military authorities and between States, “which is still based largely on notions of sovereignty”,<sup>385</sup> are required.<sup>386</sup> States need to recognize that the concept of State sovereignty is an evolving concept, influenced by prevailing factors that are crucial for society at a given time and circumstance. Environmental impacts of aviation are a prevailing concern now and, hence,

---

<sup>377</sup> *Chicago Convention*, *supra* note 42, art 1.

<sup>378</sup> *Ibid*, art 68.

<sup>379</sup> *Annex 11*, *supra* note 266 at 2-1.

<sup>380</sup> *Chicago Convention*, *supra* note 42, art 9(a).

<sup>381</sup> See *ibid*, art 9(c).

<sup>382</sup> See Fitzgerald, *supra* note 373 at 217.

<sup>383</sup> *Ibid*. Fitzgerald, *ibid* at 218, n 171, notes: “United Airlines’ longest non-stop flights operating the 7,789 mile route between Chicago and Hong Kong would probably not be possible year-round in both directions without Russian cooperation. The routing is essentially straight over the North Pole and over Eastern Siberia. Before the new arrangement, the flight was often weight restricted, meaning that either passengers or cargo was turned away.”

<sup>384</sup> See also Brown, *supra* note 372 at 121.

<sup>385</sup> Aldo Armando Cocca, “The Chicago Convention and Technological Development in Air and Space” (1994) 19:2 *Ann Air & Sp L* 135 at 148.

<sup>386</sup> See Roberto Kobeh González, “Towards a Transformed ATM environment – Working together” (Opening address by the President of the ICAO Council to the World ATM Congress 2013, Madrid, 12 – 14 February 2013) [unpublished] (González urged that “we must promote greater cooperation and coordination between civil and military authorities for flexible use of national airspace” at 3).

may influence the notion of sovereignty of States over their airspace. At this stage, it is necessary to shed some light on the evolution of this notion both in general international law and in international aviation law.

#### **4.5.3.2 The evolution of the concept of State sovereignty**

State sovereignty is one of the fundamental principles of international law.<sup>387</sup> The French philosopher Jean Bodin introduced the concept of State sovereignty to the Western world.<sup>388</sup> Bodin notes that sovereignty is the most high, absolute, and perpetual power over the citizens and subjects in a commonwealth.<sup>389</sup> Since then, State sovereignty has been defined and redefined many times in the scholarly literature,<sup>390</sup> and most definitions “include some combination of internally and externally oriented attributes or capacities.”<sup>391</sup> Internally, State sovereignty is defined as a State’s “positive ability to act and to achieve the results it wants, especially within its territory”.<sup>392</sup> The externally oriented components of the doctrine of State sovereignty cover States’ “relative freedom from outside interference, a negative feature rather than a positive ability to achieve a desired effect”.<sup>393</sup> Thus, State sovereignty essentially means the right of a State within its territory to exercise its functions to the exclusion of other States.<sup>394</sup> Brownlie describes State sovereignty in the following terms: “The competence of states in respect of their territory is usually described in

---

<sup>387</sup> See Samantha Besson, “Sovereignty” in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law <opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1472>; MP Ferreira-Snyman, “The Evolution of State Sovereignty: A Historical Overview” (2006) 12:2 *Fundamina* 1 at 1 (HeinOnline).

<sup>388</sup> See Jean Bodin, *Les six livres de la république*, 4th ed (Paris: Chez Jacques du Puys, 1576). See also Besson, *supra* note 387; Ruwantissa Abeyratne, *Convention on International Civil Aviation: A Commentary* (London, UK: Springer International, 2014) at 16.

<sup>389</sup> See Bodin, *supra* note 388 at 125.

<sup>390</sup> See also Biong Kuol Deng, “The Evolving Concept and Institution of Sovereignty Challenges and Opportunities”, Africa Institute of South Africa Policy Brief No 28 (June 2010), online: Africa Institute of South Africa <www.ai.org.za/wp-content/uploads/downloads/2011/11/No-28.-The-Evolving-Concept-and-Institution-of-Sovereignty.pdf> (the concept of State sovereignty “has undergone a series of deconstruction and reconstruction processes, a fact that defies the notion that sovereignty, as a concept, is a fixed or permanent feature in terms of its norms and practices” at 1).

<sup>391</sup> Kathryn Hochstetler, Ann Marie Clark & Elisabeth J Friedman, “Sovereignty in the Balance: Claims and Bargains at the UN Conferences on the Environment, Human Rights, and Women” (2000) 44:4 *Intl Studies Q* 591 at 592 (Wiley). See also Ferreira-Snyman, *supra* note 387.

<sup>392</sup> Hochstetler, Clark & Friedman, *supra* note 391 at 592.

<sup>393</sup> *Ibid.*

<sup>394</sup> See generally JG Starke, *Introduction to International Law*, 10th ed (London, UK: Butterworths, 1989) at 157; Sharon Anne Williams & Armand LC de Mestral, *An Introduction to International Law: Chiefly as Interpreted and Applied in Canada*, 2nd ed (Toronto: Butterworths, 1987) at 108; Abeyratne, *supra* note 388 at 17.

terms of sovereignty... The normal complement of state rights, the typical case of legal competence, is described commonly as ‘sovereignty’... In brief, ‘sovereignty’ is legal shorthand for legal personality of a certain kind, that of statehood”.<sup>395</sup>

This normative perspective of exclusivity of the notion of sovereignty commenced to turn to an approach accommodating globalization and democratization in the 1960s and 1970s,<sup>396</sup> as viewed by legal scholars, due to “a shift in focus of international law, later fuelled by the end of the Cold War”.<sup>397</sup> In fact, the history of State sovereignty “can be understood through two broad movements, manifested in both practical institutions and political thought.”<sup>398</sup> The first movement is “the development of a system of sovereign states, culminating at the Peace of Westphalia in 1648”.<sup>399</sup> European rulers concluded this peace treaty to end their prolonged rivalries and struggles – both religious and secular – during the sixteenth and seventeenth centuries.<sup>400</sup> Contemporaneously, the concept “became prominent in political thought through the writings of Machiavelli, Luther, Bodin, and Hobbes”.<sup>401</sup> The second movement is the circumscription of the sovereign State that commenced “in practice after World War II”.<sup>402</sup> During this second movement, the doctrine of State sovereignty “has evolved and taken on different personas over time: it has been reformulated periodically to fit the demands and exigencies of specific historical periods or episodes”.<sup>403</sup> Indeed, meaningful legal and institutional circumscriptions of the concept arose after the Holocaust, “many of which have come to abridge the rights of sovereign states quite significantly. The two most prominent curtailments are conventions on human rights and European integration.”<sup>404</sup> The development of *jus cogens* or peremptory norm of general international law

---

<sup>395</sup> Brownlie, *supra* note 34 at 105–06.

<sup>396</sup> See also Francis P Schubert, “The Creation of a Single European Sky: The Shrinking Concept of Sovereignty” (2000) 25 *Ann Air & Sp L* 239 (“[i]n the context of international relations, sovereign borders have traditionally been viewed as absolute, yet the importance of such boundaries has started to decrease over past decades, especially with the emergence of economic globalization” at 246).

<sup>397</sup> Abeyratne, *supra* note 388 at 17.

<sup>398</sup> Dan Philpott, “Sovereignty” in Edward N Zalta, ed, *The Stanford Encyclopedia of Philosophy* (Summer 2014 Edition), online: Stanford University <[plato.stanford.edu/archives/sum2014/entries/sovereignty/](http://plato.stanford.edu/archives/sum2014/entries/sovereignty/)>.

<sup>399</sup> *Ibid.*

<sup>400</sup> See Robert Jackson, *Sovereignty* (Cambridge: Polity Press, 2007) at 1. See also Deng, *supra* note 390 (the Westphalian State system “was anchored in the treaties that were signed in 1648 in Westphalia to end a 30 year war in Europe with a view to achieving peace, security and political stability in Europe” at 2).

<sup>401</sup> Philpott, *supra* note 398.

<sup>402</sup> *Ibid.*

<sup>403</sup> Jackson, *supra* note 400 at 1–2.

<sup>404</sup> Philpott, *supra* note 398 (in practice, since World War II, this circumscription has “continued through European integration and the growth and strengthening of laws and practices to protect human rights”).



after World War II has severely circumscribed the concept of sovereignty.<sup>405</sup> Article 53 of the *Vienna Convention* defines peremptory norm as:

[A] norm accepted and recognized by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.<sup>406</sup>

Thus, Professors Williams and de Mestral argue that “[t]oday sovereignty is a matter of degree. By entering into the community of nations and participating in the United Nations and other international organizations states have restricted their own liberty.”<sup>407</sup> Starke aptly asserts that “it is probably more accurate today to say that the sovereignty of a state means the *residuum* of power which it possesses within the confines laid down by international law.”<sup>408</sup> Interestingly, to Kelsen, “sovereignty” is an ambiguous term in relation to State and, thus, he advises not to use this term “at all in relation to” the State.<sup>409</sup> Kelsen argues:

Since sovereignty originally means an absolute quality, relative sovereignty – whether it means not a supreme but the one next to the supreme authority, or only internal not also external sovereignty, or not total but divided sovereignty – is a contradiction in terms. There is in the English language no specific term to express the idea that the state, as the national legal order, is subordinated only to the international legal order. (The German term “*Voelkerrechtsunmittelbarkeit*” is not translatable.) It is by this direct relation to international law that we may differentiate the state as a juristic person or corporation, and the corporations within the state: the latter are subject to the national legal order, to the law of the state within which they are established. The state as a juristic person is the personification of a relatively centralized legal order, inferior only to international law. This is the nature of the state as subject of international law.<sup>410</sup>

With respect to airspace sovereignty, although this concept factually goes back to Roman times, States’ recognition of such concept emerged at the beginning of the twentieth century.<sup>411</sup>

---

<sup>405</sup> See Besson, *supra* note 387. For a useful discussion on *jus cogens*, see Jochen A Frowein, “Ius Cogens” in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law <opil.oup.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1437>.

<sup>406</sup> *Vienna Convention on the Law of Treaties*, 23 May 1969, 1155 UNTS 331, art 53 (entered into force 27 January 1980).

<sup>407</sup> Williams & de Mestral, *supra* note 394 at 46.

<sup>408</sup> Starke, *supra* note 394 at 100 [emphasis in original].

<sup>409</sup> Hans Kelsen, *Principles of International Law* (New York: Rinehart, 1952) at 113.

<sup>410</sup> *Ibid* at 113–14.

<sup>411</sup> See Abeyratne, *supra* note 388 at 15, 17. Abeyratne, *ibid* at 15–16 [emphasis in original] [footnotes omitted], asserts:

The genesis of the concept of sovereignty in airspace is traced to Emperor Justinian’s *Corpus Juris Civilis*, where the concept seemed to be an inference from a passage in the Digest. Accordingly, airspace at that time became, at international law a contentious issue when it came to justifying the removal of projections from an adjoining property over a place of burial. Bouve added the view that airspace was new space added

Several aerial incidents, which occurred during that period,<sup>412</sup> provided the required “impetus for public international law to take over the issue of rights over airspace”.<sup>413</sup> In 1910, the French Government quickly called a conference of European powers where participating States, for the first time, “recognized airspace as belonging to individual States.”<sup>414</sup> This was the “first diplomatic conference to consider flight regulation”,<sup>415</sup> and is regarded as “a major step in the development of international air law”.<sup>416</sup> This 1910 conference held in Paris “first evidenced general international agreement that usable space above the lands and waters of a State is part of the territory of that State.”<sup>417</sup> The 1910 Conference “evidenced tacit but actual agreement of the delegations of the States there represented” on the following:

- (1) that each State had full sovereignty in flight-space over its national lands and waters as part of its territory;
- (2) that any division of such territorial flight-space into zones is impractical and unnecessary;
- (3) that no general right of international transit or commerce exists for aircraft of other States through such territorial flight-space.<sup>418</sup>

It was demonstrated that “the only practical legal method of regulating international flight was by international agreement providing for the grant of privileges of entry under terms and conditions there stated”.<sup>419</sup>

Following the 1910 Paris Conference, “international developments [of air law] were rapid.”<sup>420</sup> A good number of States – mostly European – asserted sovereignty over the airspace above their territories through, *inter alia*, the promulgation of national laws aimed at controlling

---

to accommodate man’s ability to fly. Thus, the right bestowed by the private law maxim *Cujus est solum, ejus est usque ad coelum* was formally entrenched as [an] absolute right of a person under ancient Roman law. This maxim, which means that a right of land ownership brings with it rights of ownership of airspace above the land, was later found to be unacceptable as an absolute rule. Disparaged by some commentators as the “product of some black letter lawyer”, the rule was later adapted to mean that no nation acquired any domain in what was known as navigable airspace until such domain was needed to protect subjacent territory.

<sup>412</sup> In August 1904, Russian guards shot down the German balloon, Tschudi, when it was flying outside Russian territory. Two unrelated but similar incidents occurred in 1908 and 1910 respectively. See *ibid* at 17.

<sup>413</sup> *Ibid.*

<sup>414</sup> *Ibid.*

<sup>415</sup> Ivan A Vlastic, ed, *Explorations in Aerospace Law: Selected Essays by John Cobb Cooper 1946-1966* (Montreal: McGill University Press, 1968) at 105.

<sup>416</sup> *Ibid* at 126.

<sup>417</sup> *Ibid* at 105.

<sup>418</sup> *Ibid* at 123–24.

<sup>419</sup> *Ibid* at 124.

<sup>420</sup> *Ibid* at 126.

all flights over their surface territories and at forbidding foreign flights from entering into their sovereign airspace.<sup>421</sup> The number of States asserting such jurisdiction rapidly increased after the outbreak of World War I in 1914.<sup>422</sup> Most importantly, no single State questioned, even before the outbreak of World War I, such assertion of sovereign right over the airspace above a State's sovereign territory.<sup>423</sup> Hence, Professor Cooper argues, "it is apparent that by the outbreak of World War I", the international community had accepted the principle of airspace sovereignty as a customary rule.<sup>424</sup> Events during World War I, i.e. the rapid increase of the number of States asserting sovereign jurisdiction over the airspace above their surface territories, "merely acknowledged...this already existing rule of customary international air law".<sup>425</sup>

After World War I, the first international air law instrument, namely the *Paris Convention* of 1919, was concluded, wherein the customary international law principle of sovereignty of States over their respective airspace was recognized and codified.<sup>426</sup> As appears from the preceding discussion, the *Paris Convention* was not the first to evidence States' acceptance of the principle of airspace sovereignty; "the preparation and signature of the...Convention of 1919 merely acknowledged and restated" this customary international law principle.<sup>427</sup> Therefore, this customary rule of airspace sovereignty was again recognized and codified in the *Chicago Convention* of 1944, which is presently the primary source of public international air law.<sup>428</sup> Indeed, other norms of international civil aviation and "virtually all air law", including the *Chicago Convention*, is based on the concept of airspace sovereignty.<sup>429</sup>

Nevertheless, it is argued, "there is a continuing trend away from the absolute airspace sovereignty regime towards something less."<sup>430</sup> Back in 1981, Professor Matte predicted that the

---

<sup>421</sup> See *ibid*, ch 7.

<sup>422</sup> See *ibid* at 133–36.

<sup>423</sup> See *ibid* at 136.

<sup>424</sup> *Ibid* at 136.

<sup>425</sup> *Ibid*.

<sup>426</sup> See *Convention relating to the Regulation of Aerial Navigation*, 13 October 1919, 11 LNTS No 297 at 173, art 1 (not in force) [*Paris Convention*].

<sup>427</sup> Vlastic, *supra* note at 136.

<sup>428</sup> See generally Milde, *International*, *supra* note 71 at 17.

<sup>429</sup> Abeyratne, *supra* note 388 at 17. See also Vlastic, *supra* note at 136; Karl-Heinz Böckstiegel & Paul Michael Krämer, "Filling in the Gaps of the Chicago Convention: Main Features of the New Legal Framework for Aviation in the European Community" (1994) 19:1 *Ann Air & Sp L* 127 at 127 (interestingly, the authors assert that this "ultimate foundation of the Chicago Convention...is, in the absence of some limiting arrangement...its weak point" at 127 [footnote omitted]).

<sup>430</sup> Stephen M Shrewsbury, "September 11th and the Single European Sky: Developing Concepts of Airspace Sovereignty" (2003) 68:1 *J Air L & Com* 115 at 116 (HeinOnline).

notion of sovereignty “will be overtaken by...a new international legal order”, and “will evolve so that the order of importance, such as is presently drawn from conventions on aerial navigation will be changed, making State sovereignty conditional upon the freedom of international movement.”<sup>431</sup> Matte’s predictions have commenced to realize. As Abeyratne notes, “[p]ost World War II attitudes towards the concept of sovereignty in airspace and the philosophy of air law range between the unlimited public law right of a State to exercise sovereignty over its airspace and the idea of free movement of air traffic.”<sup>432</sup> In order to keep pace with world’s growing economy, the current global economy places “great pressure on leading states to develop new ideas about sovereignty over airspace”.<sup>433</sup> Shrewsbury argues that “changes in the understanding and the characterizations of airspace sovereignty have marched on in steady fashion”, and “the move towards a different kind of airspace sovereignty regime will continue as economic and other forces drive change”, even after the tragic events of September 11, 2001.<sup>434</sup> Likewise, Schubert contends that “[a] growing stream of opinion is calling for a new understanding of national sovereignty, which would incorporate present and projected political, economic, and institutional realities”.<sup>435</sup> Former ICAO Council President Assad Kotaite argues that “sovereignty is essential, but sovereignty is being eroded. At the same time, sovereign jurisdictions are growing in number as the concept of sovereignty continues to evolve.”<sup>436</sup> Shrewsbury aptly notes:

What has become clear in the last few decades is that the economic aspects of airspace sovereignty have dominated change, or the lack thereof, in the international air sovereignty regime. Essentially, the laissez-faire proponents have continued to advocate freedom of the air with unrestricted competition, while proponents of economic control have generally advocated absolute airspace sovereignty as a tool of maintaining control and ensuring survival of their national flagship carriers. Of course, national security concerns are always present, but the driving force in the development of air sovereignty law has been decidedly economic in nature.<sup>437</sup>

Judge Manfred Lachs contends that the Latin maxim *cuius est solum eius usque ad coelum*, from which the concept of State sovereignty over airspace flows, is “not law or rather, may only

---

<sup>431</sup> Nicolas Mateesco Matte, *Treatise on Air-Aeronautical Law* (Montreal: ICASL, McGill University, 1981) at 79.

<sup>432</sup> Abeyratne, *supra* note 388 at 17.

<sup>433</sup> Shrewsbury, *supra* note 430 at 116.

<sup>434</sup> *Ibid.*

<sup>435</sup> Schubert, *supra* note 396 at 259.

<sup>436</sup> Assad Kotaite, “Is there a Lessening of State Sovereignty or a Real Will to co-operate globally?” (1995) 20:6 *Air & Space L* 288 at 288 (Kluwer Law Online).

<sup>437</sup> Shrewsbury, *supra* note 430 at 142.

encapsulate a legal rule or indicate a direction.”<sup>438</sup> According to Lachs, States’ efforts at the Chicago Conference “to establish a multilateral system, a series of freedoms of the air,” would lessen the stringency of the principle of airspace sovereignty.<sup>439</sup> Furthermore, the air traffic growth and the mutual dependence of States in the development of civil aviation gravely affected the exercise of State control over their airspace.<sup>440</sup> In fact, “a thorough reading of the Chicago Convention would reveal that the Convention does not authorize unrestricted freedom to [Contracting] States.”<sup>441</sup> This is also apparent from Article 9 that, though sanctions States the right to establish restricted or prohibited zone, requires, *inter alia*, that “[s]uch prohibited areas shall be of reasonable extent and location so as not to interfere unnecessarily with air navigation.”<sup>442</sup> Furthermore, according to Article 22, Contracting States agree “to adopt all practicable measures, through the issuance of special regulations or otherwise, to facilitate and expedite navigation by aircraft between the territories of contracting States, and to prevent unnecessary delays to aircraft, crews, passengers and cargo”.<sup>443</sup>

#### **4.5.3.3 Climate change and global warming: new forces in the evolution process**

Climate change and global warming are new forces that can, and should, drive change in

---

<sup>438</sup> Manfred Lachs, “Freedoms of the Air – the Way to Outer Space” in Tanja L Masson-Zwaan & Pablo MJ Mendes de Leon, eds, *Air and Space Law: De Lege Ferenda: Essays in honour of Henri A. Wassenbergh* (Dordrecht: Martinus Nijhoff, 1992) 241 at 241.

<sup>439</sup> *Ibid* 242. See also Shrewsbury, *supra* note 430 (“[d]espite the failure of the Chicago Conference to achieve a comprehensive freedom of the air regime, bilateral agreements are based on commercial freedom of the air and thus are at least a step towards overall freedom of airspace” at 138 [footnote omitted]).

<sup>440</sup> See Lachs, *supra* note 438 at 243. See also Cocca, *supra* note 385 at 148.

<sup>441</sup> Md Tanveer Ahmad, “Achieving Global Safety in Civil Aviation: A Critical Analysis of Contemporary Safety Oversight Mechanisms” (2012) 37 *Ann Air & Sp L* 81 at 115. See also Cocca, *supra* note 385 at 145; Dempsey, *supra* note 17 at 44. Cocca, *ibid* at 145–46, states that “[c]ertain provisions of the Convention impact upon the notion of State sovereignty. For instance, the First Freedom of the air, namely the right of a non-scheduled aircraft to penetrate the airspace of a foreign State without obtaining prior permission, as codified in Article 5, places boundaries on the legitimate actions of the overflown State.” Shrewsbury, *supra* note 430 at 137, argues that, “[w]hen viewed from a sovereignty standpoint, ... bilateral agreements [authorized by Article 6 of the Convention] served as a limitation of airspace sovereignty for mutual benefit.”

<sup>442</sup> *Chicago Convention*, *supra* note 42, art 9(a). Cocca, *supra* note 385 at 146, asserts:

This provision further restricts the overflown State’s possible courses of action in the case where a foreign aircraft overflies a prohibited zone. According to Articles 9(c), 10 and 11, the overflown State may force an aircraft, engaged in international air transport and overflying its territory, to stop at a customs or designated airport for examination purposes. In this connection, Article 3*bis* on the use of force against civil aircraft... further limits the rights of States by forbidding the use of force against civil aircraft in flight, even in the case where such aircraft is clearly violating some international obligation.

<sup>443</sup> *Chicago Convention*, *supra* note 42, art 22.

the understanding and characterizations of sovereignty of airspace.<sup>444</sup> The issue of air pollution, which is inextricably linked with climate change and global warming, has already circumscribed the exercise of State sovereignty. Back in 1941, it was held, in the famous *Trail Smelter* arbitration, that the principles of international law do not grant any State “the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.”<sup>445</sup> The Tribunal relied on and expanded the principle that the exclusive right of every State within its territory to exercise its functions to the exclusion of other States by reason of its territorial sovereignty “has as corollary a duty: the obligation to protect within the territory the rights of other States, in particular their right to integrity and inviolability in peace and in war, together with the rights which each State may claim for its nationals in foreign territory.”<sup>446</sup>

The *Trail Smelter* arbitration gave birth to the established customary international law principle according to which States have a sovereign right to exploit their own resources and the simultaneous responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.<sup>447</sup> This principle is also recognized under Principle 21 of the *Stockholm Declaration* and Principle 2 of the *Rio Declaration*,<sup>448</sup> and “already forms the basis for”<sup>449</sup> the *Long-Range Transboundary Air*

---

<sup>444</sup> A similar argument concerning the right of overflight is made by Jae Woon Lee, “Revisiting Freedom of Overflight in International Air Law: Minimum Multilateralism in International Air Transport” (2013) 38:4/5 *Air & Space L* 351 (Kluwer Law Online) (“global environmental concern...demands universal freedom of overflight as an effective measure to mitigate climate change” at 367). This will definitely require variations in the understanding and the characterizations of airspace sovereignty.

<sup>445</sup> *Trail Smelter Arbitration (United States v Canada)* (1938), 3 RIAA 1905 at 1965, reprinted in 33 AJIL 182 (Arbitrators: Charles Warren, Robert AE Greenshields, Jan Frans Hostie).

<sup>446</sup> *The Island of Palmas Case (or Miangas) (United States v Netherlands)* (1928), 11 RIAA 829 at 839 (Permanent Court of Arbitration) (Arbitrator: M Huber). See also Sands et al, *supra* note 37 at 196.

<sup>447</sup> See e.g. “Report of the Commission to the General Assembly on the work of its fifty-third session” (UN Doc A/56/10) in *Yearbook of the International Law Commission 2001*, vol 2, part 2 (New York: UN, 2007) at 148 (UNDOC. A/CN.4/SER.A/2001/Add.1 (Part 2)); Adam, *supra* note 38 at 28.

<sup>448</sup> *Declaration of the United Nations Conference on the Human Environment*, 16 June 1972, 11 ILM 1416, Principle 21, online: UNEP <[www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503](http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503)>; *Rio Declaration*, *supra* note 125, Principle 2.

<sup>449</sup> Birnie, Boyle & Redgwell, *supra* note 12 at 339.

*Pollution Convention*,<sup>450</sup> the *Vienna Convention*,<sup>451</sup> and the *UNFCCC*.<sup>452</sup> In the *Corfu Channel Case*, the ICJ stated that “every State’s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States” is a “general and well-recognized” principle.<sup>453</sup> In the *Legality of the Threat or Use of Nuclear Weapons Case*, the Court opined that “[t]he existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment.”<sup>454</sup> It should be noted that environmental treaties preceding the *Stockholm Declaration* also contain provision(s) that provides for such State obligation toward other States.<sup>455</sup> A good number of treaties post-*Stockholm Declaration* provide the same.<sup>456</sup> Therefore, it is evident that environmental concerns have already commenced to drive change in the understanding and characterizations of sovereignty.

Climate change and global warming as environmental concerns can likewise influence the notion of sovereignty of airspace. Nonetheless, there exists controversy regarding whether such change will affect the principle itself.<sup>457</sup> Since any attempt to manifestly compromise the principle of sovereignty may encounter resistance from States, it is, therefore, preferable to argue that such transformation will and has already commenced to bring a new way of exercising national sovereignty – “an *evolution* in the *exercise* of national sovereignty”<sup>458</sup> – that will accommodate

---

<sup>450</sup> *Convention on Long-Range Transboundary Air Pollution*, 13 November 1979, 1302 UNTS 217, Can TS 1983 No 34 (entered into force 16 March 1983).

<sup>451</sup> *Vienna Convention*, *supra* note 181.

<sup>452</sup> *UNFCCC*, *supra* note 3.

<sup>453</sup> *The Corfu Channel Case*, [1949] ICJ Rep 4 at 22.

<sup>454</sup> *Legality of the Threat or Use of Nuclear Weapons Case*, Advisory Opinion, [1996] ICJ Rep 226 at 241–42. See also *Iron Rhine Arbitration*, *supra* note 187 at para 222.

<sup>455</sup> See e.g. *International Plant Protection Convention*, 6 December 1951, 150 UNTS 67, Can TS 1953 No 16, Preamble; *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, 5 August 1963, 480 UNTS 43 at 45, art 1(1)(b), Can TS 1964 No 1; *African Convention on the Conservation of Nature and Natural Resources*, 15 September 1968, 1001 UNTS 3 at 10, art 16(1)(b). See also Sands et al, *supra* note 37 at 197–98.

<sup>456</sup> See e.g. *Treaty for Amazonian Co-operation*, 3 July 1978, 1202 UNTS 51 at 72, art 4; *Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific*, 12 November 1981, IELMT 981:85, art 3(5); *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3, art 193, UKTS 1999 No 81. See also Sands et al, *supra* note 37 at 198–99.

<sup>457</sup> See Shrewsbury, *supra* note 430 at 157.

<sup>458</sup> Peter Haanappel, “The Transformation of Sovereignty in the Air” (1995) 20:6 *Air & Space L* 311 at 317 (Kluwer Law Online) (“[t]ransformation of sovereignty in the air is not really occurring...[W]hat seems to be happening is an *evolution* in the *exercise* of national sovereignty” at 317 [emphasis in original]).

climate change and global warming concerns.<sup>459</sup> The new understanding and characterizations of airspace sovereignty, which should not negatively affect the fundamental substance of State sovereignty, are required to evade the prevailing impediments to operational improvements arising from States' strict adherence to the doctrine of airspace sovereignty to lessen aviation's contribution to climate change and global warming.<sup>460</sup>

Concerning airspace sovereignty, the EU has taken various initiatives that are facilitating a new understanding of sovereignty of airspace within the EU airspace. The Single European Sky, which is an "initiative of organising airspace into functional blocks, according to traffic flows rather than to national borders",<sup>461</sup> and backed by the Single European Sky ATM Research [SESAR] Programme that "will provide advanced technologies and procedures with a view to modernising and optimising the future European [air traffic management] network",<sup>462</sup> is a laudable step in this connection.<sup>463</sup> National sovereignty concerns could not prevent the establishment of Single European Sky since political will played a significant role in this respect.<sup>464</sup> The EU "has demonstrated that the basis of the Chicago Convention's complete and exclusive sovereignty can be overcome to the benefit of all players."<sup>465</sup> The creation of the Single European Sky exhibits that factors, which were and will continue to be primarily economic, distinct from State interests in maintaining sovereignty over airspace are gradually "drawing states away from

---

<sup>459</sup> See e.g. Schubert, *supra* note 396 at 248, 259; Civil Air Navigation Services Organisation (CANSO), *Air Space Sovereignty*, ICAO Worldwide Air Transport Conference (ATCONF), 6th Mtg, Agenda Items 1, 1.1, Working Paper, Doc ATConf/6-WP/80 (4 March 2013), online: ICAO <[www.icao.int/Meetings/atconf6/Documents/WorkingPapers/ATConf.6.WP.080.1.en.pdf](http://www.icao.int/Meetings/atconf6/Documents/WorkingPapers/ATConf.6.WP.080.1.en.pdf)> [CANSO, *Air Space*].

<sup>460</sup> See Schubert, *supra* note 396 ("[a] new understanding of national sovereignty can bypass these limitations without negatively impacting upon the essence of State sovereignty" at 259). See also Cocca, *supra* note 385 at 148.

<sup>461</sup> EUROCONTROL, "Single European Sky", online: EUROCONTROL <[www.eurocontrol.int/dossiers/single-european-sky](http://www.eurocontrol.int/dossiers/single-european-sky)> [EUROCONTROL, "Single"]. Schubert, *supra* note 396 at 258, argues that "[f]uture models of efficient airspace management, and particularly a Single European Sky, will require new methodologies and philosophies whereby [Air Traffic Control] sectors are dictated purely by operational requirements. The importance of national borders for these models will gradually dissipate."

<sup>462</sup> EUROCONTROL, "Single", *supra* note 461.

<sup>463</sup> However, this is not the first time that the EU ignored national borders for the advancement of aviation. Böckstiegel & Krämer, *supra* note 429 at 133, notes that "regulation has been set at the Community level in the field of competition law, slot allocation, computerized reservation systems, harmonisation of safety rules, common rules for personnel licenses, aircraft noise, etc."

<sup>464</sup> Schubert, *supra* note 396 at 259, contends that "[t]here is no legal justification to oppose a major reorganization of European airspace, regardless of national borders, on the ground of national sovereignty. The Single European Sky will arise out of material changes in the international legal framework only as a result of political will."

<sup>465</sup> Böckstiegel & Krämer, *supra* note 429 at 138.



the Chicago Convention's absolute sovereignty formula."<sup>466</sup> It is true that the EU is a special case since the EU Member States have already surrendered substantial sovereignty to Brussels, mainly for economic and political reasons "in order to secure lasting peace",<sup>467</sup> which renders it less uncomplicated for the EU to take such initiatives. Nevertheless, the EU Member States have not granted exclusive competence in the entire field of international civil aviation to the EU and,<sup>468</sup> hence, it is not as uncomplicated as it is thought to be. Therefore, these new examples set by the EU, not only for economic but also for environmental reasons, deserve consideration by other States while reevaluating the doctrine of sovereignty of airspace to accommodate environmental causes.<sup>469</sup>

With regard to prohibited area that concerns Article 9 of the *Chicago Convention*, an admirable step has been taken by NAV Canada, a corporatized entity "that owns and operates Canada's civil air navigation service".<sup>470</sup> To ensure access of civil aircraft to a segment of airspace in eastern Quebec, which was historically reserved as a military flying area, NAV Canada finalized an arrangement with the Department of National Defence in Spring 2012, under which civil aircraft would have access to that airspace when not required for military operations.<sup>471</sup> If required for military operations, 3 Wing Bagotville, one of the Wings of the Royal Canadian Air Force

---

<sup>466</sup> Shrewsbury, *supra* note 430 at 150. Shrewsbury, *ibid* at 150, states that, "given the growth in air traffic, an underlying need for efficiency and air safety have added to the momentum towards change – a change resulting in the continuing erosion in the absolute airspace sovereignty doctrine. Creating a Single European Sky is proof of that."

<sup>467</sup> EU, "The history of the European Union", online: EUROPA <europa.eu/about-eu/eu-history/index\_en.htm>.

<sup>468</sup> The Court of Justice of the European Union, in *Air Transport Association of America*, *supra* note 376 at I-13876–I-13877, held:

[W]hilst it is true that the European Union has in addition acquired certain exclusive powers to agree with third States commitments falling within the field of application of the European Union legislation on international air transport and, consequently, of the Chicago Convention..., that does not mean that it has exclusive competence in the entire field of international civil aviation as covered by that [Chicago Convention].

<sup>469</sup> Commenting on the European Economic Community, which precedes the European Community and the European Union, Williams & de Mestral, *supra* note 394 at 46 [emphasis in original], assert:

The European Economic Community is a prime example where 12 states engage in supranational enterprise which entails interdependence and results in *engrenage*. Such interplay and reliance among states is a fact of international relations of the twentieth century, in which it is understood that "sovereignty" in its most emotive sense is not the ultimate goal.

<sup>470</sup> NAV Canada, "About Us", online: NAV Canada <www.navcanada.ca/en/about-us/Pages/default.aspx>.

<sup>471</sup> See NAV Canada, *CIFER 2013: Collaborative Initiatives for Emissions Reductions: Forward thinking for a smaller footprint* (2013) at 7, online: NAV Canada <www.navcanada.ca/EN/media/Publications/CIFER-Report-2013-EN.pdf> [NAV Canada, *CIFER 2013*].

[RCAF],<sup>472</sup> will secure the airspace by NOTAM.<sup>473</sup> The allocation of airspace is located near RCAF Base Bagotville, “but also falls in the middle of the inbound and outbound traffic flow from the mid-US to Europe. Traditionally the airspace was ‘closed’ to commercial traffic for 16 hours per day on weekdays, necessitating significant diversions.”<sup>474</sup> As a consequence of this arrangement, “on most days what had been approximately a six minute route diversion can be avoided, saving an estimated \$2 million in fuel costs per year.”<sup>475</sup>

Call for a new understanding of and a new way of exercising sovereignty to accelerate operational improvement is coming from the aviation industry as well. Roberto Kobeh González, the former ICAO Council President, emphasized the need to “consider sovereignty within the context of the global, harmonized air navigation framework”,<sup>476</sup> and stated that “[s]overeignty must not be an obstacle to progress in making institutional the required changes for a more efficient management of the global air navigation system.”<sup>477</sup> According to González, “[m]ajor efficiency gains will be attained through global integration rather than by rigid boundary structures.”<sup>478</sup> CANSO, “the global voice of air navigation service providers (ANSPs) worldwide”,<sup>479</sup> argues that, since “a global, seamless, and performance-based approach to management of airspace, rather than one based on national borders” is required for air navigation services, “all stakeholders need a fully developed understanding of the meaning of national sovereignty consistent with present and future

---

<sup>472</sup> 3 Wing Bagotville of the Royal Canadian Air Force is “located in Quebec’s Saguenay region. It provides general purpose, multi-role, combat capable forces in support of domestic and international roles of the Royal Canadian Air Force (RCAF). It also provides search and rescue missions”. Royal Canadian Air Force, “3 Wing Bagotville”, online: Royal Canadian Air Force <[www.rcaf-arc.forces.gc.ca/en/3-wing/index.page](http://www.rcaf-arc.forces.gc.ca/en/3-wing/index.page)>.

<sup>473</sup> See NAV Canada, *CIFER 2013*, *supra* note 471 at 7. A NOTAM is “a notice distributed by means of telecommunications containing information concerning the establishment, conditions or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.” NAV Canada, *Aeronautical Information Management: Canadian NOTAM Procedures Manual*, P-NOF-101 Version 14.10 (2014) at para 1.1.2, online: NAV Canada <[www.navcanada.ca/EN/media/Publications/NOTAM-Manual-EN.pdf](http://www.navcanada.ca/EN/media/Publications/NOTAM-Manual-EN.pdf)>.

<sup>474</sup> NAV Canada, *CIFER 2013*, *supra* note 471 at 7.

<sup>475</sup> *Ibid.*

<sup>476</sup> González, *supra* note 386 at 3 (he further emphasized the “need to focus on international rather than on purely national requirements” at 3).

<sup>477</sup> *Ibid* at 4.

<sup>478</sup> *Ibid* at 3.

<sup>479</sup> Civil Air Navigation Services Organisation, “About CANSO”, online: CANSO <[www.canso.org/about](http://www.canso.org/about)>. Members of CANSO support over 85 percent of world air traffic. They “share information and develop new policies, with the ultimate aim of improving air navigation services (ANS) on the ground and in the air. CANSO represents its Members’ views in major regulatory and industry forums, including at ICAO, where it has official Observer status. CANSO has an extensive network of Associate Members drawn from across the aviation industry.” *Ibid.*

political, economic and social realities.”<sup>480</sup> In this context, “sovereignty should be seen as an enabler, not a barrier, in making the required changes for a more efficient management of the global air navigation system.”<sup>481</sup> CANSO believes that, “[u]sed in a constructive way, sovereignty can proactively drive the necessary improvements in global and regional air traffic management...performance.”<sup>482</sup>

The rationale for State sovereignty in aviation mainly relates to security and national defense.<sup>483</sup> Hence, as Schubert argues, “practical mechanisms must be developed to guarantee stable control over access to national airspace, as well as compliance with the applicable rules governing this airspace.”<sup>484</sup> Additionally, “the core elements of sovereignty must be clearly distinguished from those elements that are not perforce State obligations, but which have traditionally been integrated with the broader vision of sovereignty.”<sup>485</sup> Although the question of States’ security remains on the agenda, “it may be looked upon in another way than that of yesterday”, Lachs argues.<sup>486</sup> The EU and Canada have demonstrated that national security and airspace sovereignty can be separated to accelerate operational improvements thus reducing emissions from aviation that contribute to climate change and global warming.<sup>487</sup> It can be argued, in line with González, that “[a]irspace structures can no longer be based only on national and domestic considerations, as important as these may be.”<sup>488</sup>

#### **4.5.3.4 Conclusion**

ICAO’s hard work in the field of operational improvement to optimize aircraft operations “to improve environmental performance while maintaining safety”<sup>489</sup> should not be frustrated by States’ firm adherence to the concept of airspace sovereignty, which is the basis of air law though. We should bear in mind that the doctrine of State sovereignty, though “has proved to be remarkably

---

<sup>480</sup> CANSO, *Air Space*, *supra* note 459 at 1.

<sup>481</sup> *Ibid* at 3.

<sup>482</sup> *Ibid*.

<sup>483</sup> See Schubert, *supra* note 396 at 259.

<sup>484</sup> *Ibid*.

<sup>485</sup> *Ibid*.

<sup>486</sup> Lachs, *supra* note 438 at 245.

<sup>487</sup> See also Shrewsbury, *supra* note 430 (“the development of the airspace law has proved a promising prospect in redefining the traditional ways states view sovereignty” at 160).

<sup>488</sup> González, *supra* note 386 at 3.

<sup>489</sup> ICAO, “Operational Measures”, *supra* note 316.

long-lasting”, is “not fixed and unchanging”.<sup>490</sup> The concept of airspace sovereignty was codified in multilateral air law treaties (namely, the 1919 *Paris Convention* and the 1944 *Chicago Convention*) “at a time when civil aviation was still in its infancy.”<sup>491</sup> As noted, the doctrine of State sovereignty has evolved and been reformulated periodically to meet the demands and necessities of specific historical periods or episodes.<sup>492</sup> More importantly, the concept has been circumscribed. Improvements in operations will increase efficiency, ensure greater safety, save fuel, and, in the process, airlines’ money. Thus, operational improvements concern not only economic factors but also climate change and global warming. Hence, the need to improve operational practices can, and should, steer change in the understanding and the characterizations of airspace sovereignty, and will, and has already commenced to, bring about a new understanding of national sovereignty. Article 1 of the *Chicago Convention* confirming the principle of State’s sovereignty over the airspace above its territory “should be interpreted with greater flexibility.”<sup>493</sup> An efficient operational system in conjunction with other mitigation measures can facilitate the abatement of emissions from international civil aviation that contribute to climate change and global warming.

## **4.6 Sustainable alternative fuels for aviation**

### **4.6.1 Sustainable alternative fuels: a key measure to reducing environmental footprints of aviation**

Unquestionably, as argued earlier, improvements in technology and operations are two important technical tools included in the basket of mitigation measures that will deliver long-term, permanent solutions to the issue of emissions from aviation that hasten climate change and global warming. Nonetheless, it is evident from the foregoing discussion that those measures are unable to provide near-term solutions for several reasons. Therefore, to “offset the expected fuel consumption increases, based on air traffic growth forecasts for the next 40 years”,<sup>494</sup> like global market-based measures, sustainable alternative fuels for civil aviation, where kerosene is the

---

<sup>490</sup> Jackson, *supra* note 400 at 1.

<sup>491</sup> Lachs, *supra* note 438 at 242.

<sup>492</sup> See Jackson, *supra* note 400 at 1–2.

<sup>493</sup> Lachs, *supra* note 438 at 244.

<sup>494</sup> ICAO Secretariat, “Overview – Sustainable Alternative Fuels: Sustainable Alternative Fuels for Aviation” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 122 at 122 [ICAO Secretariat, “Overview – Sustainable”].

primary energy source,<sup>495</sup> are essential as a near-term solution.<sup>496</sup> This is also demonstrated by Figure 1 above. It is estimated that, “[i]f commercial aviation were to get 6% of its fuel supply from biofuel by 2020, this would reduce its overall carbon footprint by 5%.”<sup>497</sup> Moreover, such fuels will act as catalysts to lessen the burden on other two technical measures in the basket, namely technology and operational improvements, to achieve required fuel efficiency to attain carbon neutral growth from 2020.<sup>498</sup>

Sustainable alternative fuels “are fuels that can have a lower life cycle greenhouse gas (GHG) footprint than conventional fuels.”<sup>499</sup> ICAO considers that sustainable alternative fuels can deliver “a promising solution” to the issue of emissions from international civil aviation.<sup>500</sup> When alternative fuels are produced from renewable sources or waste materials, these fuels have the potential to significantly reduce greenhouse gas emissions, on a life-cycle basis.<sup>501</sup> Although biofuel combustion produces carbon dioxide (CO<sub>2</sub>), such emissions can be considered neutral, “since the emitted carbon comes from biomass and will return to that same material.”<sup>502</sup> As a consequence, “only the emissions induced by feedstock production, transportation, and processing have to be accounted for in a field-to-tank approach.”<sup>503</sup> Likewise, the production of such fuels from industrial waste reduces emissions “through the cascading use of fossil carbon.”<sup>504</sup>

As a technical measure, sustainable alternative fuels can provide both near-term and long-term solutions in contrast to market-based measures that, as economic measures, can only provide a near-term solution. As noted earlier, market-based measures as economic measures can only create pressure on the industry to alter their behavior from profit-oriented activities to

---

<sup>495</sup> See also Ribeiro et al, *supra* note 172 at 334, 354; ICAO Sustainable Alternative Fuels (SUSTAF) Experts Group, “Sustainable Alternative Fuels: Challenges for the Development and Deployment of Sustainable Alternative Fuels in Aviation: Outcomes of ICAO’s SUSTAF Experts Group” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 126 at 126 [ICAO SUSTAF, “Sustainable”].

<sup>496</sup> See ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 122.

<sup>497</sup> ATAG, “Facts”, *supra* note 293.

<sup>498</sup> See e.g. Charles E Schlumberger, “Are Alternative Fuels an Alternative?: A Review of the Opportunities and Challenges of Alternative Fuels for Aviation” (2010) 35:1 *Ann Air & Sp L* 119 at 122. Schlumberger, *ibid* at 122, asserts that “[a]chieving ‘CNG 2005’ from 2020 through 2030 without biofuels would require fuel efficiency to improve 43 per cent by 2020 from 2005 standards. With biofuels (17 billion liters, 6 per cent of fuel use by 2020), the fuel efficiency required to hit ‘CNG 2005’ would be substantially less because of lower emissions from fuel burn.”

<sup>499</sup> ICAO SUSTAF, “Sustainable”, *supra* note 495 at 126.

<sup>500</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 122.

<sup>501</sup> See *ibid*.

<sup>502</sup> *Ibid*.

<sup>503</sup> *Ibid*.

<sup>504</sup> *Ibid*.

environmentally responsible profit-oriented activities through the adoption of various initiatives, mainly technical measures. These economic measures can only incentivize in-sector reductions. Thus, they can only reduce but cannot completely restrict emissions. Hence, it has been argued that market-based measures should be considered temporary, supplementary measures delivering near-term solution. In contrast, technical measures have the potential to completely stop emissions and, hence, sustainable alternative fuels can provide near-term as well as long-term solution.

#### **4.6.2 Existing situation with respect to sustainable alternative fuels for aviation**

Two landmark approvals by the American Society for Testing and Materials (now referred to as ASTM International) for the use of up to 50 percent alternative fuel blended with conventional fuel, the Fischer-Tropsch fuel, and the Hydro-processed Esters and Fatty Acids [HEFA] fuel in 2009 and 2011, respectively, opened “[t]he door to the first commercial use of sustainable alternative fuels in aviation”.<sup>505</sup> These approvals of “drop-in”<sup>506</sup> fuels for aviation were regarded “a significant breakthrough since these fuels are fully compliant with the stringent requirements for aviation fuels, preserving safety, as well as [compatible] with existing systems, meaning that they can be “dropped in” or substituted for conventional fuels.”<sup>507</sup> The HEFA fuels produced from the hydro-processing of vegetable oils and animal fats, “allowed the production of the first batches of biofuel for commercial flights”.<sup>508</sup> The use of such alternative fuels has increased since September 2011 that demonstrates “the viability of these fuels for aviation.”<sup>509</sup> It is worth noting that “the idea of producing fuels from alternative sources is not new”.<sup>510</sup> Alternative fuels produced from “coal, natural gas, or other hydrocarbon feedstocks – synthetic fuels – have existed for several decades”.<sup>511</sup> Since World War II, the production of jet fuel from coal by applying the Fischer-

---

<sup>505</sup> *Ibid.*

<sup>506</sup> An alternative fuel that “meets the same specifications as the existing fuel type is considered a “drop-in fuel” and is in compliance with already established and certified operating limitations for existing aircraft and engine systems.” Schlumberger, *supra* note 498 at 144.

<sup>507</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 122.

<sup>508</sup> *Ibid.*

<sup>509</sup> *Ibid.* ICAO Secretariat, “Overview – Sustainable”, *ibid* at 122, notes:

As of June 2012 more than 18 airlines had collectively performed over 1,500 commercial flights that used alternative fuels, including regularly scheduled flights. Further initiatives are currently underway in all regions of the world to introduce sustainable alternative fuels into commercial aviation. Airlines and airports have entered into agreements for sustainable alternative fuels in North America, Europe, the Middle East, Latin America, South America, and the Asia-Pacific region, making this a truly global activity.

<sup>510</sup> Schlumberger, *supra* note 498 at 124.

<sup>511</sup> *Ibid* at 125.

Tropsch method has been performed – “first in Germany and later in South Africa.”<sup>512</sup>

With respect to sustainable alternative fuels, “ICAO is actively engaged in activities to promote and facilitate the emergence of [such] fuels in aviation by exchanging and disseminating information, fostering dialogue among States and stakeholders, and carrying out dedicated work as requested by ICAO [Contracting] States to inform decision making.”<sup>513</sup> In November 2009, the ICAO Conference on Aviation and Alternative Fuels sanctioned “the use of sustainable alternative fuels for aviation, particularly the use of drop-in fuels in the short to mid-term, as an important means of reducing aviation emissions”.<sup>514</sup> The Conference also launched the ICAO Global Framework for Aviation Alternative Fuels.<sup>515</sup> In June 2012, ICAO created Sustainable Alternative Fuels [SUSTAF] Experts Group “to develop recommendations relating to ongoing challenges in the development and deployment of sustainable alternative fuels for aviation, with a view to supporting States and the industry in their efforts to develop and deploy alternative aviation fuels.”<sup>516</sup> In the same month, ICAO’s “Flightpath to a Sustainable Future” initiative – which was considered a “significant alternative fuels achievement” by ICAO – was launched in cooperation with aviation industry partners.<sup>517</sup> The 38<sup>th</sup> Session of the ICAO Assembly requested the Council, *inter alia*, to:

- encourage the ICAO Contracting States and “invite industry, financial institutions and other international organizations to actively participate in exchange of information and best practices and in further work” under the Organization on sustainable alternative fuels for aviation;<sup>518</sup> and
- collect information on progress of such fuels in aviation “to give a global view of the

---

<sup>512</sup> *Ibid* [footnote omitted]. Schlumberger, *ibid* at 124–25 [footnotes omitted], notes:

During World War II, the Germans successfully developed and produced synthetic fuels from coal using the Fischer-Tropsch process, which converted gasified low-grade coal to 100 octane aviation gasoline as well as to diesel fuel. The method was further enhanced by South Africa, when it faced difficulties importing sufficient petroleum based products during the economic embargo of the apartheid era. With large coal reserves at its [disposal], the South African petrochemical group SASOL continues today to produce diesel and jet fuel from coal by applying the Fischer-Tropsch process.

<sup>513</sup> ICAO, “Alternative Fuels: Questions and Answers: 7. What is ICAO Doing in the Field of Alternative Fuels?”, online: ICAO <[www.icao.int/environmental-protection/Pages/AltFuel-IcaoAction.aspx](http://www.icao.int/environmental-protection/Pages/AltFuel-IcaoAction.aspx)>.

<sup>514</sup> *ICAO Res A38-18*, *supra* note 67 at I-69.

<sup>515</sup> See *Ibid*. At the 38<sup>th</sup> Session of the ICAO Assembly meeting, the Assembly requested the ICAO Council to “continue to maintain the ICAO Global Framework for Aviation Alternative Fuels (GFAAF)”. *Ibid* at I-75.

<sup>516</sup> ICAO SUSTAF, “Sustainable”, *supra* note 495 at 126.

<sup>517</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 124.

<sup>518</sup> *ICAO Res A38-18*, *supra* note 67 at I-75.

future use of alternative jet fuels and to account for changes in life cycle [greenhouse gas] emissions in order to assess progress toward achieving global aspirational goals”.<sup>519</sup>

In response, ICAO created the Alternative Fuels Task Force in November 2013 within the CAEP, with the mandate “to assess the range of potential emissions reductions from the use of alternative fuels to 2050.”<sup>520</sup>

The approval of the Fischer-Tropsch and the HEFA fuels for use in aviation has not stopped further progress;<sup>521</sup> “additional processes are currently under approval by ASTM [International], and will diversify available pathways for aviation fuel supply”.<sup>522</sup> The two new families of processes are “alcohol-to-jet” processes, which “use ethanol or butanol as intermediate products in order to produce jet fuel grade hydrocarbons from starch and sugar feedstock”, and “sugar-to-hydrocarbon” process, which “uses advanced fermentation to convert starch and sugar feedstock directly into hydrocarbons.”<sup>523</sup> It is expected that these new families of processes will further “enable the use of lignocellulosic feedstock such as woody biomass, herbaceous crops or agricultural residues, which will allow for the production of jet fuel from sources that are less expensive than vegetable oil, without the capital expenditure involved in Fischer-Tropsch conversion.”<sup>524</sup>

#### **4.6.3 Prevailing challenges surrounding sustainable alternative fuels**

Several challenges ranging from production to deployment still remain with respect to sustainable alternative fuels. Alternative fuels are still commercially unviable mainly because of the high and uncertain costs of such fuels, and the lack of availability in sufficient quantities to meet the demand of commercial aviation industry.<sup>525</sup> ICAO notes that the current price gap with

---

<sup>519</sup> *Ibid* at I-76.

<sup>520</sup> ICAO, “Alternative Fuels: Question 7: What are the past and current achievements of ICAO in the field of alternative fuels?”, online: ICAO <[www.icao.int/environmental-protection/Pages/AltFuels-Q7-3.aspx](http://www.icao.int/environmental-protection/Pages/AltFuels-Q7-3.aspx)>.

<sup>521</sup> See DW Fahey et al, “Aviation and Climate: State of the Science” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 48 (“[r]esearch is underway to produce and evaluate other bio-derived fuels” at 52–53).

<sup>522</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 122.

<sup>523</sup> *Ibid*.

<sup>524</sup> *Ibid* (“Pyrolysis and catalytic cracking are additional processes currently under development which produce a kind of “bio-crude” that can be refined into jet fuel using an approach similar to the refining of crude oil” at 122).

<sup>525</sup> See ICAO, “Alternative Fuels: Questions and Answers 5. What are the Challenges for the Development and Deployment of Alternative Fuels?”, online: ICAO <[www.icao.int/environmental-protection/Pages/AltFuels-](http://www.icao.int/environmental-protection/Pages/AltFuels-)



conventional jet fuel is a major obstacle to deployment of such fuels, and this price gap “is likely to continue during the initial development phase before technological progress and economies of scale combine to result in cost reductions.”<sup>526</sup> Hence, at present, airlines are not in a position to purchase them and,<sup>527</sup> as a consequence, has made “investment in the industry less attractive”.<sup>528</sup> Furthermore, “since aviation represents less than 5% of the world’s liquid fuel consumption,” it is likely that fuel producers may primarily “target larger markets”.<sup>529</sup> Without the ability to compete on price, companies in the entire value chain of alternative jet fuels find it difficult “to demonstrate their viability and thus complete financing for commercial projects.”<sup>530</sup> In this respect, civil aviation encounters “an unbalanced competition with road transport”.<sup>531</sup> Because renewable energy policies in most States “support the deployment of biofuels for road transportation”,<sup>532</sup> combined with the fact that the cost of producing alternative fuels for aviation is higher than for road transportation.<sup>533</sup> For example, the cost of producing hydro-processed renewable jet fuel from oil crops and biomass to liquids applying the Fischer-Tropsch conversion, “the two most promising methods in terms of cost”, is “50 to 100 per cent above the cost of jet fuel produced from crude oil”.<sup>534</sup> In reality, the higher production cost, which varies from methods to methods, is one of the main reasons for insufficient investment. Due to lack of investment,<sup>535</sup> “full commercial

---

Challenges.aspx> [ICAO, “Alternative Fuels: Challenges”]. See also Barker et al, *supra* note 214 at 51; Ribeiro et al, *supra* note 172 at 355.

<sup>526</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 124. See also ICAO SUSTAF, “Sustainable”, *supra* note 495 at 126.

<sup>527</sup> See ICAO SUSTAF, “Sustainable”, *supra* note 495 (“[w]ith no compensation mechanism to reward airlines for using environmentally beneficial fuels, there are small, limited markets for aviation biofuels at current prices, which is higher than prices for conventional jet fuel” at 126).

<sup>528</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 124.

<sup>529</sup> ICAO Secretariat, “Sustainable Alternative Fuels for Aviation: Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 158 at 160 [ICAO Secretariat, “Sustainable”].

<sup>530</sup> ICAO SUSTAF, “Sustainable”, *supra* note 495 at 126 (additionally, “advanced biofuels in general are currently perceived by investors and lenders as a less attractive investment that has more risk than other, more mature, renewable energy technologies, such as wind and solar” at 126).

<sup>531</sup> *Ibid.*

<sup>532</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 124. See also ICAO SUSTAF, “Sustainable”, *supra* note 495 (“alternative fuel policies tend to favour road transportation: more public research has been funded in this area, the use of biofuels is often enforced through mandatory incorporation in gasoline and diesel (“blending mandates”), and tax exemptions are used to compensate the extra cost compared to conventional fuels” at 127).

<sup>533</sup> This is because of “aviation’s requirement for “drop-in” fuels calls “for more advanced processes than those used for the first generation of road transportation biofuels..., and for further upgrading of the fuel in order to meet jet fuel specifications.” ICAO SUSTAF, “Sustainable”, *supra* note 495 at 126–27.

<sup>534</sup> Schlumberger, *supra* note 498 at 148.

<sup>535</sup> Both “the testing of new [alternative] fuels and the establishment of new production facilities require significant capital investment.” ICAO Secretariat, “Sustainable”, *supra* note 529 at 160.

production of these fuels has not yet started”<sup>536</sup> rendering these fuels unavailable in sufficient quantities to feed the commercial aviation industry.<sup>537</sup> ICAO SUSTAF Experts Group considers that “stimulating the necessary capital investment to ramp up production” is currently “the most significant challenge”.<sup>538</sup>

Another concern is that emissions from the production process of these fuels are uncertain, and this is one of the “significant challenges for a commercial-scale deployment of alternative fuels in aviation over the long-term”.<sup>539</sup> Though the production of such fuels from coal, natural gas, or other hydrocarbon feedstock are well established, “the production of synthetic fuel from coal is controversial” from an environmental perspective mainly because the coal-to-liquid “process results in very high CO<sub>2</sub> emissions.”<sup>540</sup> Production of biofuels will require “change in land use for expanded agricultural production, which may result in increased [greenhouse gas] emissions, and a loss of biodiversity.”<sup>541</sup> This change in land use may affect land used for food production which is, as Schlumberger notes, “the most controversial issue concerning the widespread production of biofuel”.<sup>542</sup> Insufficient “amount of available agricultural land (and in case of competing uses for that land) for traditional and dedicated energy crops” is constraining the biofuel potential in general, according to the IPCC fourth assessment report.<sup>543</sup> Huge tracts of land are required “to switch from crude oil to biomass based jet fuel” and, to satiate this requirement of land, traditional crop farmers may be motivated “to switch their production to more lucrative biofuels”.<sup>544</sup> This conversion of cropland to production of feedstock for alternative fuels will negatively affect food production and, consequently, food security. Hence, the availability of

---

<sup>536</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 124.

<sup>537</sup> See ICAO Secretariat, “Sustainable”, *supra* note 529 at 160; ICAO, “Alternative Fuels: Challenges”, *supra* note 525.

<sup>538</sup> ICAO SUSTAF, “Sustainable”, *supra* note 495 at 126.

<sup>539</sup> *Ibid.* See also *r* at 51; Ribeiro et al, *supra* note 172 at 355.

<sup>540</sup> Schlumberger, *supra* note 498 at 145–46 [footnote omitted]. Schlumberger, *ibid* at 145–46, further notes that “the high initial cost of establishing a [coal-to-liquid] project, the relatively high energy input required, and the cost of either CO<sub>2</sub> penalties or [carbon capture and storage] infrastructure, will continue to present a major hurdle for a wide-scale development of this source of coal-based fuel products.”

<sup>541</sup> *Ibid* at 146 [footnote omitted] (“the land use change can lead to significant CO<sub>2</sub> emissions, especially when forests, savannah, grassland and abandoned land are converted to biofuel cropland” at 146–47 [footnote omitted]). See also Ribeiro et al, *supra* note 172 (“the production of biofuels on a massive scale may require deforestation and the release of soil carbon” at 344).

<sup>542</sup> Schlumberger, *supra* note 498 at 147 (“the additional demand for biomass production will in most cases be at the expense of cropland currently producing food supply” at 147).

<sup>543</sup> Ribeiro et al, *supra* note 172 at 344.

<sup>544</sup> Schlumberger, *supra* note 498 at 148.

sustainable feedstock is another significant challenge “for a commercial-scale deployment of alternative fuels in aviation over the long-term”.<sup>545</sup>

The requirement for water is another challenge since this may affect biodiversity.<sup>546</sup> The production of biofuels needs 70 to 400 times more water than required for “energy derived from other sources, such as fossil fuels, wind, and solar.”<sup>547</sup> The requirement of more water will result in diversion of water from crop irrigation to biofuel production, leading to “major challenges or even conflicts in many parts of the world” already suffering from water shortage and in “decrease of water quality”.<sup>548</sup> Dearth of “economically recoverable agricultural and silvicultural waste streams” is also hampering biofuel potential in general.<sup>549</sup>

Apart from the environmental perspective, the requirement of huge land surface for the production of alternative fuels is one of the stumbling blocks for the large-scale commercialization and production of such fuels from a commercial perspective.<sup>550</sup> Land acquisition may be required not only for the production of feedstock but also for the erection of necessary infrastructure, which is a costly, complex, and challenging process.<sup>551</sup> Again, the size of the land area required to produce feedstock depends on the type of feedstock.<sup>552</sup> A rough estimate concerning three

---

<sup>545</sup> ICAO SUSTAF, “Sustainable”, *supra* note 495 at 126. Some potential sustainable aviation biofuel feedstocks are: Camelina, Algae, Jatropha, Halophytes, and household and municipal waste. See Air Transport Action Group, *Beginner’s Guide to Aviation Biofuels*, 2nd ed (Geneva: ATAG, 2011) at 4–5 [ATAG, *Beginner’s*, 2nd ed].

<sup>546</sup> See Schlumberger, *supra* note 498 at 147.

<sup>547</sup> *Ibid* [footnote omitted].

<sup>548</sup> *Ibid*. Schlumberger, *ibid* at 147, notes that “[t]he main problem is one of eutrophication, a process whereby water receives excess nutrients that stimulate excessive plant growth, thereby reducing dissolved oxygen and causing other organisms to dies. The result is decreased biodiversity, changes in species composition and dominance, as well as toxicity effects that can affect large areas.”

<sup>549</sup> Ribeiro et al, *supra* note 172 at 344.

<sup>550</sup> See Schlumberger, *supra* note 498 at 149.

<sup>551</sup> See also *ibid*.

<sup>552</sup> See *ibid*.

feedstocks, namely, Algae,<sup>553</sup> Camelina,<sup>554</sup> and Jatropha,<sup>555</sup> shows that, to completely supply the aviation industry, the land requirements for the production of these feedstocks are:

- 68,000 square kilometer of land area or about the size of Ireland for Algae;
- 2,000,000 square kilometer of land area or the size of Mexico for Camelina; and
- 2,700,000 square kilometer of land area or the size of Argentina Jatropha.<sup>556</sup>

The non-existence of the required technology to produce the sufficient amount of aviation alternative fuels is another issue. ICAO concedes that, since this is a relatively “young sector”, many technologies are still at their preliminary stage.<sup>557</sup> According to the IPCC fourth assessment report, the unavailability of “proven and cost-effective conversion technology” is curbing the biofuel potential in general.<sup>558</sup>

Along with ensuring sustainable production, guaranteeing sustainable deployment of alternative fuels is also a challenge.<sup>559</sup> Unless both the production and deployment of such fuels

---

<sup>553</sup> Potentially, the most promising feedstock for the production of sustainable alternative aviation biofuel in large quantities is Algae. These microscopic plants can be grown in inhospitable places, e.g., polluted water, salt water, and deserts. They thrive off CO<sub>2</sub> that makes them ideal for carbon capture (i.e. absorbing CO<sub>2</sub>) from sources like power plants. One of the biggest advantages of Algae for the production of biofuels is that this feedstock can grow much faster than other biofuel crops. It has been estimated that Algae can produce up to 15 times more fuel per square kilometre than other feedstock. Another advantage of Algae is that this biofuel crop can be grown on marginal lands which are not used for growing food, e.g., the edges of deserts. See ATAG, *Beginner's*, 2nd ed, *supra* note 545 at 4.

<sup>554</sup> Primarily, Camelina is an energy crop with high lipid oil content. The primary market for oil produced from this crop is “as a feedstock to produce renewable fuels. The left over solid ‘meal’ from the oil extraction process can also be used as a feed supplement for poultry and livestock.” This energy crop is frequently “grown as a rotational crop with wheat and other cereal crops when the land would otherwise be left fallow (unplanted) as part of the normal crop rotation programme.” Therefore, Camelina provides “growers with an opportunity to diversify their crop base and reduce mono-cropping (planting the same crop year after year), which has been shown to degrade soil and reduce yields and resistance to pests and diseases.” *Ibid*.

<sup>555</sup> Jatropha is a plant which produces seeds containing inedible lipid oil. This lipid oil can be used to produce biofuel. Each seed produces 30 – 40 percent of its mass in fuel. This plant can be “grown in a range of difficult soil conditions, including arid and otherwise non-arable areas, leaving prime land available for food crops. The seeds are mildly toxic to both humans and animals and are therefore not a food source.” *Ibid*.

<sup>556</sup> See Air Transport Action Group, *Beginner's Guide to Aviation Biofuels* (Geneva, ATAG, 2009) at 18, online: National Center for Food and Agricultural Policy <[www.ncfap.org/documents/biofuels\\_aviation/BeginnersGuide\\_Biofuels\\_WebRes.pdf](http://www.ncfap.org/documents/biofuels_aviation/BeginnersGuide_Biofuels_WebRes.pdf)>; Schlumberger, *supra* note 498 at 148–50. Ireland has 68,883 square kilometer of land area. See US, Central Intelligence Agency, “The World Factbook: Europe: Ireland”, online: Central Intelligence Agency <[www.cia.gov/library/publications/the-world-factbook/geos/ei.html](http://www.cia.gov/library/publications/the-world-factbook/geos/ei.html)>. Mexico has 1,943,945 square kilometer of land area. See US, Central Intelligence Agency, “The World Factbook: North America: Mexico”, online: Central Intelligence Agency <[www.cia.gov/library/publications/the-world-factbook/geos/mx.html](http://www.cia.gov/library/publications/the-world-factbook/geos/mx.html)>. Argentina has 2,736,690 square kilometers of land area. See US, Central Intelligence Agency, “The World Factbook: South America: Argentina”, online: Central Intelligence Agency <[www.cia.gov/library/publications/the-world-factbook/geos/ar.html](http://www.cia.gov/library/publications/the-world-factbook/geos/ar.html)>.

<sup>557</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 125.

<sup>558</sup> Ribeiro et al, *supra* note 172 at 344.

<sup>559</sup> See ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 125.

are sustainable, it will be meaningless to produce and use those fuels in civil aviation since assuring sustainability is one of the main goals in this respect. In this regard, assessing the suitability of such fuels for climate mitigation is crucial. Several aspects are involved while evaluating “the suitability of alternative fuels for climate mitigation”, the most important being “the lifecycle or well-to-wake evaluation of CO<sub>2</sub> emissions that demonstrates whether an alternative fuel reduces net emissions in aviation operations.”<sup>560</sup> At present, “[m]any of the controlling factors in the lifecycle analysis are...outside of typical aviation operations and would undergo development as the use of alternative fuels increases globally”.<sup>561</sup>

As noted above, CO<sub>2</sub> emissions from biofuel combustion can be considered neutral.<sup>562</sup> However, emissions of non-CO<sub>2</sub> gases from the combustion of alternative fuels remain a great concern. According to the current scientific understanding, compared to conventional jet fuels, “alternative fuels and blended fuels will have similar or reduced [radiative] forcings from the non-CO<sub>2</sub> contributions, although important uncertainties remain concerning...cloudiness” from aircraft operating at or near cruise altitudes.<sup>563</sup> If radiative forcings from the non-CO<sub>2</sub> contributions remain the same or are marginally reduced, and if such emissions cause cloudiness,<sup>564</sup> which “is a key aspect of aviation radiative forcing and one that is visible to the human eye”,<sup>565</sup> the use of such fuels to reduce emissions from international civil aviation to combat climate change and global warming will become pointless.

Unless all these issues surrounding the alternative fuels are effectively handled and

---

<sup>560</sup> Fahey et al, *supra* note 521 at 53.

<sup>561</sup> *Ibid.*

<sup>562</sup> See ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 122.

<sup>563</sup> Fahey et al, *supra* note 521 at 53. Fahey et al, *ibid* at 53, note:

Recent studies have characterized the emissions from alternative fuels using commercial engines in ground-based tests. The reduced sulfur and aromatic contents in synthetic, biomass, or fuel blends with JP8 or Jet-A result in significantly lower particulate matter emissions when measured as mass or number of particles (see Lobo et al. (2011))... The consequences of particulate matter reduction for the amount or character of aviation cloudiness is not known currently, although a reduction in the number of ice particles produced will likely shorten the lifetime of the contrail as ice particles grow and precipitate. A complication is that aromatic content may be augmented to protect aircraft mechanical seals. NO<sub>x</sub> and CO emissions are similar or reduced for Fisher-Tropsch fuels and fuel blends with JP8 compared to JP8 while VOCs show a mixed response (Timko et al., 2011).

<sup>564</sup> See also World Bank, *Air Transport and Energy Efficiency*, Transport Papers, TP – 38 (February 2012), online: World Bank <[siteresources.worldbank.org/INTAIRTRANSPORT/Resources/TP38.pdf](http://siteresources.worldbank.org/INTAIRTRANSPORT/Resources/TP38.pdf)> (some research suggests that “these clouds may have different cooling and warming effects, depending on whether flights occur during the day or night” at 31).

<sup>565</sup> Fahey et al, *supra* note 521 at 50.

resolved, the potential sustainable alternative fuels hold in reducing environmental footprint of civil aviation will indefinitely remain untapped. More research and development, increased cooperation among States as well as among international and regional organizations, and necessary regulatory, policy and financial measures are required in this respect.<sup>566</sup> Sustainable alternative fuels have to be made commercially viable where both production and deployment of such fuels are sustainable. Presently, ICAO acts as a facilitator by supporting “States and stakeholders in their efforts to address the...challenges to initiate commercial-scale deployment and create a viable and sustainable aviation alternative fuels industry.”<sup>567</sup> However, ICAO needs to play a leading role in this respect that may require this international body to act beyond its “facilitator” role. Nevertheless, like technology, it will take a considerable amount of time for sustainable alternative fuels to become commercially viable. The aviation industry anticipates that “scaling-up production might take several decades before alternative fuels can entirely replace traditional jet fuel.”<sup>568</sup> Even former ICAO Council President González asserted in February 2013 that “there is no alternative to current aviation fuel in the foreseeable future.”<sup>569</sup> In such a circumstance, the development and implementation of a global market-based measure for international civil aviation is immediately required if States are actually interested to reduce emissions from civil aviation that contribute to climate change and global warming.

#### **4.7 Conclusion: the extent of effectiveness of global measures: need for reform?**

Climate change and global warming are happening and have become a global challenge. To tackle this global challenge, contributions from all the sectors are imperative; all sectors must act immediately, collectively, and simultaneously. As an important global transportation sector, international civil aviation must contribute to those global efforts. However, it appears that neither the existing and envisaged legal measures nor the basket of mitigation measures in their current state can effectively govern emissions from international civil aviation that contribute to climate change and global warming. No effective, binding legal measure is in place in the field of international civil aviation that addresses these environmental problems. ICAO’s basket of

---

<sup>566</sup> See ICAO SUSTAF, “Sustainable”, *supra* note 495 at 127, 130; ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 124–25; Schlumberger, *supra* note 498 at 151–52.

<sup>567</sup> ICAO Secretariat, “Overview – Sustainable”, *supra* note 494 at 125.

<sup>568</sup> Schlumberger, *supra* note 498 at 150.

<sup>569</sup> González, *supra* note 386 at 2.

mitigation measures is at its elementary stage and, unsurprisingly, is fraught with difficulties. Aerospace technology has not reached its required stage, and developments of such technologies are lengthy and expensive. Operational improvements cannot reduce emissions to the required level. Sustainable alternative fuels for aviation are still commercially unviable, and suffer from several production and deployment problems. Most importantly, no global market-based measure for international civil aviation is in place that can provide a meaningful, cost-effective, near-term solution. Unfortunately, the latest session of the ICAO Assembly has deferred the development of such measures until the next session to be held in 2016. Market-based measures deserve priority, since these measures can supplement other measures and funds generated thereunder can be used to provide financial assistance to economically feeble States, who are incapable of taking initiatives toward reducing emissions from aviation.

Although cooperation between ICAO and Annex I developed State Parties to the *Kyoto Protocol* with regard to international aviation has been mandated by the Protocol, the *Chicago Convention* confers a tacit obligation on ICAO, and the Organization has been relentlessly working as a facilitator – not as a regulator – to govern emissions from international civil aviation, the initiatives taken by ICAO to date have failed to provide any effective system to tackle the climate impact of aviation.<sup>570</sup> However, it is not fair to solely attribute this failure to the Organization. It is the ICAO Contracting States that are more responsible for this failure than the Organization itself. Professor Milde aptly argues:

It would be grossly unfair to put any blame for the failure to find a solution on ICAO. ICAO is no more than a forum of its contracting States and those States so far failed to define a common ground – they hardly could have found a solution to the vast economic disparities that are at the roots of the divergent opinions.<sup>571</sup>

This chapter has demonstrated that differences between developed and developing States greatly contribute to that failure of the aviation industry. Those differences have to be immediately reconciled for the sake of protecting the environment. Both groups of States have to be prepared to sacrifice some of their interests in this regard. Furthermore, States should not strictly adhere to the archaic, though established, principles of airspace sovereignty, non-discrimination, and equality of opportunity. Instead, they must give way to a new understanding of sovereignty and to

---

<sup>570</sup> See Petersen, *supra* note 11 (though “ICAO has not been completely inactive in addressing the climate impact of aviation, it should be noted that these efforts have not led to any effective system to tackle the climate impact of aviation” at 203).

<sup>571</sup> Milde, “The EU Emissions”, *supra* note 21 at 178.

emerging principles, e.g., the common but differentiated responsibilities principle with a new classification of States focused on the economical development of their airlines, for the purpose of international civil aviation. The prevailing difficulties that affect the effectiveness of the mitigation measures have to be addressed and overcome on a priority basis.

Binding legal measures, whether *de facto* or *de jure*, and a mandatory but temporary global market-based measure for international civil aviation are immediately required if States truly want to lessen the environmental footprints of international civil aviation. The need to develop new policy frameworks in aviation has been highlighted by the IPCC as well.<sup>572</sup> Since most measures, except market-based measures and, to some extent, operational opportunities, involve a time-consuming process, and since there is no possibility that climate change and global warming will regress soon, a global market-based measure for international civil aviation has to be developed and implemented without further delay. This is not to suggest that technical measures in the basket, which can provide long-term, more effective solutions, should not be considered concurrently. The IPCC fourth assessment report recommended that “analysis of near-term decisions should not be decoupled from analysis that considers long-term climate change outcomes”.<sup>573</sup> In this respect, ICAO must exert its leadership role that requires this organization to transcend its facilitator role. The pace of the entire process has to be significantly accelerated if States honestly intend to govern emissions from international civil aviation that contribute to the pace of climate change and global warming.

---

<sup>572</sup> See Barker et al, *supra* note 214 (“in order to reduce emissions from air and marine transport resulting from the combustion of bunker fuels, new policy frameworks need to be developed” at 52); Ribeiro et al, *supra* note 172 at 327.

<sup>573</sup> Barker et al, *supra* note 214 at 43.



# **Chapter 5: Effectiveness of the European Union Emissions Trading System to Reduce Emissions from International Civil Aviation that Contribute to Climate Change and Global Warming\***

## **5.1 Introduction**

The European Union [EU] has been a pioneer with respect to the adoption of legal and policy measures for the protection of the environment.<sup>1</sup> With the first European Community strategy to limit emissions of carbon dioxide (CO<sub>2</sub>) and improve energy efficiency, the measures dealing with climate change and global warming to reduce greenhouse gas emissions were commenced in 1991.<sup>2</sup> In 2003, the EU adopted *Directive 2003/87* that established the emissions trading system [ETS] of the EU.<sup>3</sup> According to the EU, the EU ETS is the “cornerstone” of the EU’s policy to reduce the anthropogenic emissions of greenhouse gases that accelerate climate change and global warming;<sup>4</sup> it is EU’s “key tool” for reducing such emissions from industrial sources in a cost-effective and economically efficient manner.<sup>5</sup> Launched on January 1, 2005, the EU ETS is the first and largest international market-based measure; it covers more than 11,000 power stations and industrial plants in 31 Member States of the European Economic Area [EEA],<sup>6</sup>

---

\* Chapter 5 has been adapted from author’s following article: “Evaluating the Effectiveness of the European Union Emissions Trading System to Reduce Emissions from International Civil Aviation” (2015) 11:1 JSDLP 115.

<sup>1</sup> See also Louise Van Schaik & Simon Schunz, “Explaining EU Activism and Impact in Global Climate Politics: Is the Union a Norm- or Interest-Driven Actor?” (2012) 50:1 J Common Market Studies 169 at 169 (Wiley).

<sup>2</sup> See Giovanni Bo, “The US Challenge to the Inclusion of Aviation Activities within the EU Emissions Trading Scheme: A US-EU Dispute with Global Repercussions”, *Law, Justice and Development E-Newsletter* (September 2011), online: World Bank <go.worldbank.org/TOM5W3VSK0>.

<sup>3</sup> See EC, *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC*, [2003] OJ, L 275/32 [*Directive 2003/87*].

<sup>4</sup> European Commission, “The EU Emissions Trading System (EU ETS)” (October 2013), online: European Commission <ec.europa.eu/clima/publications/docs/factsheet\_ets\_en.pdf>.

<sup>5</sup> European Commission, “The EU Emissions Trading System (EU ETS): Policy”, online: European Commission Climate Action <ec.europa.eu/clima/policies/ets/index\_en.htm> [European Commission, “EU ETS Policy”]. See also *Directive 2003/87*, *supra* note 3 at 34.

<sup>6</sup> The Member States of the EEA are all 28 EU Member States, and Iceland, Norway and Liechtenstein. See European Free Trade Association, “European Economic Area”, online: EFTA <www.efta.int/eea>. According to the *EEA Agreement*, when a State becomes a member of the EU, it must also apply to become a Party to the *EEA Agreement*. See EC, *Agreement on the European Economic Area*, [1994] OJ, L 1/3, art 128 [*EEA Agreement*]. To learn more about the European Economic Area, particularly on how it works, see European Free Trade Association, “The Basic Features of the EEA Agreement”, online: EFTA <www.efta.int/eea/eea-agreement/eea-basic-features> [EFTA, “The Basic”].

as well as airlines.<sup>7</sup> Since January 2012, airlines from non-EU States have been included in this scheme through *Directive 2008/101*.<sup>8</sup> Environmental groups hail this initiative of the EU which these groups demonstrated through their support by joining the defendant, United Kingdom [UK] Secretary of State for Energy and Climate Change, as interveners in the case before the Court of Justice of the European Union [CJEU] concerning the legality of *Directive 2008/101*, which included aviation in the EU ETS.<sup>9</sup>

This chapter assesses the effectiveness of the EU ETS to reduce – in other words, govern – emissions from international civil aviation, and argues that the scheme will have limited success in achieving this environmental objective. Undoubtedly, the decision to include aviation in the EU ETS is a notable step taken by the EU for a noble cause, namely to reduce emissions from aviation that significantly contribute to climate change and global warming.<sup>10</sup> This chapter demonstrates, however, that the EU ETS will only be able to partially meet this objective of limiting emissions from aviation. The most significant factor contributing to the EU ETS’s lack of complete success is that this decision was met with opposition and protest from a significant number of governments, airlines, and trade associations. This massive opposition and protest caused the EU to significantly revise its original decision until at least 2016. It is argued, as well as demonstrated, that such resistance will hinder the effectiveness of the EU ETS with respect to foreign airlines, the existing friendly relationships among States, the EU’s prospective role as a norm entrepreneur, and its ability to influence negotiations. Together, these will result in the limited effectiveness of the EU ETS in reducing emissions from aviation, thereby undermining its environmental value.<sup>11</sup>

---

<sup>7</sup> European Commission, “EU ETS Policy”, *supra* note 5.

<sup>8</sup> See EC, *Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, [2009] OJ, L 8/3 at 17 [*Directive 2008/101*].

<sup>9</sup> See *Air Transport Association of America and others v Secretary of State for Energy and Climate Change*, C-366/10, [2011] ECR I-13833 [*ATA v Secretary of State*], where five environmental groups, namely, Aviation Environment Federation, WWF-UK, European Federation for Transport and Environment, Environmental Defense Fund, and Earthjustice, joined the defendant.

<sup>10</sup> See Daniel B Reagan, “Putting International Aviation into the European Union Emissions Trading Scheme: Can Europe Do It Flying Solo?” (2008) 35:2 Boston College Env’tl Aff L Rev 349 (HeinOnline) (“[t]he [decision] embodies a progressive and timely regulatory intent to apply a novel regulatory mechanism to a specific manifestation of the climate change effects of a commercial activity, a problem that increasingly attracts global attention” at 380).

<sup>11</sup> Environmental effectiveness can be explained as “the extent to which a policy meets its intended environmental objective or realizes positive environmental outcomes”. Sujata Gupta et al, “Policies, Instruments and Co-operative Arrangements” in Bert Metz et al, eds, *Climate Change 2007: Mitigation of Climate Change: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 745 at 751.

The EU ETS is fully successful in one respect. This initiative brought the international actors to the negotiating table, and intensified the continuing international efforts to reduce emissions from aviation. This led to an agreement to develop a global market-based measure for international civil aviation, reached at the 38<sup>th</sup> Session of the Assembly of the International Civil Aviation Organization [ICAO] in October 2013. Such enhancement, however, has yet to culminate in a multilateral market-based measure. Moreover, the EU has failed to convince non-EU States to agree to unilateral market-based measures. To effectively tackle climate change and global warming from the aviation sector, we need either a well-designed, multilateral market-based measure or unilateral market-based measures of the same model adopted by economically powerful States, both of which have better prospects than the EU ETS alone has for reducing emissions from international civil aviation.

The chapter commences with a section dealing with the reasoning behind the EU's decision to include international civil aviation in the EU ETS. The third section discusses the authority of the EU to adopt unilateral environmental measures that apply to international civil aviation. The fourth section, which is the heart of this chapter, analyzes the effectiveness of unilateral measures with particular emphasis on the EU's unilateral actions and on international civil aviation. The fifth section provides the conclusion.

## **5.2 The motivating factors for introducing the EU ETS**

Including aviation in the EU ETS was not a sudden and unexpected event.<sup>12</sup> Since the EU ETS was a massive “undertaking for the continent,” and originally included major emitters except the aviation and maritime industries, “a sense of unease” commenced to develop within the EU, questioning the fairness of such exclusion.<sup>13</sup> According to the European Commission, “[e]missions

---

<sup>12</sup> See Jos Delbeke, “A New Flightplan – Getting Global Aviation Climate Measures Off the Ground” (Key Note Speech delivered at the Getting Global Aviation Climate Measures Off the Ground Conference, Norway House, Brussels, 7 February 2012) [unpublished], online: European Commission <[ec.europa.eu/clima/news/docs/speech\\_en.pdf](http://ec.europa.eu/clima/news/docs/speech_en.pdf)>; M Vittoria Giugi Carminati, “Clean Air & Stormy Skies: The EU-ETS Imposing Carbon Credit Purchases on United States Airlines” (2010) 37:2 *Syracuse J Intl L & Com* 127 at 127 (HeinOnline); Lorand Bartels, “The WTO Legality of the Application of the EU's Emission Trading System to Aviation” (2012) 23:2 *Eur J Intl L* 429 at 433. See also Steven Truxal, “The ICAO Assembly Resolutions on International Aviation and Climate Change: An Historic Agreement, a Breakthrough Deal and the Cancun Effect” (2011) 36:3 *Air & Space L* 217 (Kluwer Law Online).

<sup>13</sup> Doaa Abdel Motaal, “Curbing CO<sub>2</sub> Emissions from Aviation: Is the Airline Industry Headed for Defeat?” (2012) 3:1 *Climate L* 1 at 8 (IOS Press). See also Benoît Mayer, “*Case C-366/10, Air Transport Association of America and Others v. Secretary of State for Energy and Climate Change*”, Case Comment, (2012) 49:3 *CML Rev* 1113 at 1115–17.

from aviation are higher than from certain entire sectors covered by the EU ETS, for example refineries and steel production.”<sup>14</sup> Hence, in the Sixth Environment Action Programme 2002–2012, the EU made it clear that it would undertake “to reduce greenhouse gas emissions from aviation if no such action is agreed within [ICAO] by 2002”.<sup>15</sup> Following a review of the policy options, the European Commission adopted a Communication in September 2005 that concluded a comprehensive approach was necessary.<sup>16</sup> The main conclusion was that the EU ETS should be extended to include aviation.<sup>17</sup>

It is true that ICAO has yet to come up with effective measures to reduce emissions from international civil aviation.<sup>18</sup> Most importantly, no global market-based measure is in effect now for international civil aviation that is required to provide a temporary solution.<sup>19</sup> In 2004, the

---

<sup>14</sup> European Commission, Press Release, Memo/11/139, “Questions & Answers on historic aviation emissions and the inclusion of aviation in the EU’s Emission Trading System (EU ETS)” (7 March 2011) at 4, online: European Commission <europa.eu/rapid/press-release\_MEMO-11-139\_en.htm>.

<sup>15</sup> EC, *Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme*, [2002] OJ, L 242/1 at 1, 7. See also Paul Stephen Dempsey, *Public International Air Law* (Montreal: McGill University, Institute and Center for Research in Air & Space Law, 2008) at 471.

<sup>16</sup> See EC, Commission, *Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Reducing the Climate Change Impact of Aviation*, COM(2005) 459 final (Brussels: EC, 2005), online: EUR-Lex <eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0459:FIN:EN:PDF> [EC, *Communication*, COM(2005) 459 final]; European Commission, “Air: Climate Change”, online: European Commission Mobility and Transport <ec.europa.eu/transport/modes/air/environment/climate\_change\_en.htm>.

<sup>17</sup> See EC, *Communication*, COM(2005) 459 final, *supra* note 16 at 4.

<sup>18</sup> See Malte Petersen, “The Legality of the EU’s Stand-Alone Approach to the Climate Impact of Aviation: The Express Role Given to the ICAO by the Kyoto Protocol” (2008) 17:2 RECIEL 196 (EbscoHost) (although ICAO “has not been completely inactive in addressing the climate impact of aviation, it should be noted that these efforts have not led to any effective system to tackle the climate impact of aviation” at 203). See also Jane Barton, “Including Aviation in the EU Emissions Trading Scheme: Prepare for Take-off” (2008) 5:2 J Eur Envtl & Plan L 183 at 184 (HeinOnline) [Barton, “Including Aviation”].

<sup>19</sup> See ch 4, *above*; ICAO Secretariat, “Overview – Market-Based Measures: Market-Based Measures” in ICAO, *ICAO Environmental Report: Aviation and Climate Change* (Montreal: ICAO, 2013) 138 at 138; Sam Brand, “An Introduction to Market-based Measures” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished]; Andreas Hardeman, “Reframing Aviation Climate Politics and Policies” (2011) 36 Ann Air & Sp L 1 at 16; Annie Peterson, “A Global MBM for Aviation and Climate Change: The Time is Now!” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished]; Paul Steele, “Aviation – Benefits Beyond Borders – ICAO Destination Green” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished]; ICAO, *Environment: Market-based Measures and Climate Change* (August 2013), online: ICAO <cfapp.icao.int/tools/38thAssyikit/story\_content/external\_files/Flyer\_US-Letter\_ENV\_MBM\_s\_2013-08-30.pdf> [ICAO, *Environment: Market-based*]; DS Lee, LL Lim & B Owen, “Mitigating future aviation CO<sub>2</sub> emissions – “timing is everything”” (27 August 2013) at 2, online: Manchester Metropolitan University Dalton Research Institute <www.cate.mmu.ac.uk/docs/mitigating-future-aviation-co2-emissions.pdf>; Md Tanveer Ahmad, “Environmental Effectiveness of ICAO’s Basket of Mitigation Measures to Arrest Emissions from International Civil Aviation” (2014) 39 Ann Air & Sp L 75 [Ahmad, “Environmental”].

Committee on Aviation Environmental Protection [CAEP] of ICAO agreed at its sixth meeting that “an aviation-specific emissions trading system based on a new legal instrument under ICAO auspices “...seemed sufficiently unattractive that it should not be pursued further”.<sup>20</sup>

This outcome of the CAEP meeting has been referred to in the European Commission’s proposal to adopt a Directive to include aviation in the EU ETS,<sup>21</sup> which led to the adoption of *Directive 2008/101*,<sup>22</sup> as well as in the recital to that Directive.<sup>23</sup> Although a decision to develop a global market-based measure for aviation was reached at the latest ICAO Assembly meeting in 2013, such a measure, if agreed to by the ICAO Contracting States at the next Assembly meeting in 2016, will only become effective in 2020.<sup>24</sup> Such delay at ICAO had always been criticized by the EU and, hence, it readily included aviation in the EU ETS without waiting for a global solution.<sup>25</sup> This unilateral action from the EU implies that ICAO has failed to take necessary action(s) with respect to reducing emissions from aviation.<sup>26</sup>

The EU’s continued skepticism about ICAO’s ability to effectively address environmental issues involving aviation is evident from the reservations filed by its Member States against ICAO Assembly resolutions concerning environmental protection. The EU Member States filed

---

<sup>20</sup> EC, Commission, *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, COM(2006) 818 final – 2006/0304 (COD) (Brussels: EC, 2006) at 3, online: EUR-Lex <eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52006PC0818> [emphasis in original].

<sup>21</sup> See *ibid.*

<sup>22</sup> *Directive 2008/101*, *supra* note 8.

<sup>23</sup> See *ibid* at 4.

<sup>24</sup> See *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A38-18, 38th Sess, ICAO Doc 10022, I-68 at I-72, online: ICAO <www.icao.int/publications/Documents/10022\_en.pdf> [*ICAO Res A38-18*].

<sup>25</sup> See Claybourne Fox Clarke & Thiago Chagas, “Aviation and Climate Change Regulation” in David Freestone & Charlotte Steck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and Beyond* (Oxford: Oxford University Press, 2009) 606 at 610; Martin Staniland, “Air Transports and the EU’s Emissions Trading Scheme: Issues and Arguments” (2008–2009) 8:2 *Issues in Aviation L & Policy* 153 at 155 (HeinOnline); Matt Grote, Ian Williams & John Preston, “Direct Carbon Emissions from Civil Aircraft” (2014) 95:9 *Atmospheric Environment* 214 at 217 (Elsevier); *ATA v Secretary of State*, *supra* note 9 at I-13854–I-13856; *Air Transport Association of America and others v Secretary of State for Energy and Climate Change*, C-366/10, Advocate General’s Opinion, [2011] ECR I-13765 at I-13821; Elaine Fahey, “The EU Trading Scheme and the Court of Justice: The ‘High Politics’ of Indirectly Promoting Global Standards” (2012) 13:11 *German LJ* 1247 (HeinOnline) (in *ATA v Secretary of State*, the CJEU and Advocate General Kokott “explicitly explain that the EU ETS regime arose because of the failure of the International Civil Aviation Organisation (ICAO) to evolve a global regulatory scheme” at 1247 [footnote omitted]).

<sup>26</sup> See also Carminati, *supra* note 12 at 137; Bartels, *supra* note 12 at 433–34; Truxal, *supra* note 12 at 237; Holly Preston, David S Lee & Paul D Hooper, “The Inclusion of the Aviation Sector within the European Union’s Emissions Trading Scheme: What are the Prospects for a More Sustainable Aviation Industry?” (2012) 2 *Environmental Development* 48 at 48; *Directive 2008/101*, *supra* note 8.

reservations against Resolution A36-22,<sup>27</sup> which urged ICAO Contracting States “not to implement an emissions trading system on other Contracting States’ aircraft operators except on the basis of mutual agreement between those States”,<sup>28</sup> and against paragraph 14 of Resolution A37-19, which urged States, *inter alia*, to engage in constructive bilateral and/or multilateral consultations and negotiations with other States to reach an agreement.<sup>29</sup> Recently, a reservation has been filed against paragraph 16(a) of latest Resolution A38-18,<sup>30</sup> which, like Resolution A37-19, requires States to “engage in constructive bilateral and/or multilateral consultations and negotiations with other States to reach an agreement” when designing new and implementing existing market-based measures.<sup>31</sup> This skepticism is revealed in the latest Union legislation that amended the EU ETS, namely *Regulation 421/2014*.<sup>32</sup> This Regulation provides:

The Commission shall regularly, and at least once a year, inform the European Parliament and the Council of the progress of the [ICAO] negotiations as well as of its efforts to promote the international acceptance of market-based mechanisms among third countries. Following the 2016 ICAO Assembly, the Commission shall report to the European Parliament and to the Council on actions to implement an international agreement on a global market-based measure from 2020, that will reduce greenhouse gas emissions from aviation in a non-discriminatory manner, including on information, with regard to the use of revenues, submitted by Member States in accordance with Article 17 of Regulation (EU) No 525/2013.

---

<sup>27</sup> *Consolidated statement of continuing ICAO policies and practices related to environmental protection*, ICAO Assembly Res A36-22, 36th Sess, ICAO Doc 9902, I-54, online: ICAO <[www.icao.int/publications/Documents/9902\\_en.pdf](http://www.icao.int/publications/Documents/9902_en.pdf)> [ICAO Res A36-22].

<sup>28</sup> *Ibid* at I-73. To view the reservation, see EC, Press Release, Memo/07/391, “Written statement of reservation on behalf of the member states of the European Community (EC) and the other states members of the European Civil Aviation (ECAC) [made at the 36th Assembly of the International Civil Aviation Organization in Montreal, 18-28 September 2007]” (2 October 2007), online: Europa <[europa.eu/rapid/press-release\\_MEMO-07-391\\_en.htm](http://europa.eu/rapid/press-release_MEMO-07-391_en.htm)>.

<sup>29</sup> See *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A37-19, 37th Sess, ICAO Doc 9958, I-67 at I-71, online: ICAO <[www.icao.int/publications/Documents/9958\\_en.pdf](http://www.icao.int/publications/Documents/9958_en.pdf)> [ICAO Res A37-19]. To view the entire reservation, see Belgium, *Written Statement of Reservation by Belgium on behalf of the European Union (EU), its 27 Member States, and the 17 Other States Members of the European Civil Aviation Conference (ECAC) on Resolution A37-17/2: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: European Commission <[ec.europa.eu/clima/policies/transport/aviation/docs/reservations\\_201010\\_en.pdf](http://ec.europa.eu/clima/policies/transport/aviation/docs/reservations_201010_en.pdf)>.

<sup>30</sup> See Lithuania, *Written Statement of Reservation by Lithuania on behalf of the Member States of the European Union and 14 other Member States of the European Civil Aviation Conference (ECAC) with regard to ICAO Assembly Resolution A38-18*, at 2, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania_en.pdf)> [Lithuania, *Written Statement*].

<sup>31</sup> ICAO Res A38-18, *supra* note 24 at I-72. See also Barton, “Including Aviation”, *supra* note 18 at 185.

<sup>32</sup> EC, *Commission Regulation (EU) 421/2014 of the European Parliament and of the Council of 16 April 2014 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions*, [2014] OJ, L 129/1 [Regulation 421/2014].

In its report, the Commission shall consider, and, if appropriate, include proposals in reaction to, those developments on the appropriate scope for coverage of emissions from activity to and from aerodromes located in countries outside the EEA from 1 January 2017 onwards. In its report, the Commission shall also consider solutions to other issues that may arise in the application of paragraphs 1 to 4 of this Article, while preserving the equal treatment of all aircraft operators on the same route.<sup>33</sup>

Some authors have argued that “[n]egotiations within the ICAO have...made little progress,”<sup>34</sup> and, compared to the International Maritime Organization [IMO], ICAO’s achievement in addressing emissions from aviation is not significant.<sup>35</sup> Few scholars even consider that, rather than facilitating the development of effective measures, ICAO “has served as much, if not more, as a forum for championing causes to preclude the sector from mandatory measures” to reduce emissions from international civil aviation.<sup>36</sup> For this reason, Clarke and Chagas argue that “ICAO has been accused of failing to be sufficiently proactive and of, in effect, holding up the development of substantive [greenhouse gas] reduction measures for the [aviation] sector.”<sup>37</sup>

Nevertheless, it has to be stressed that ICAO has been relentlessly working on the issue of emissions from aviation for the last decade.<sup>38</sup> The argument that ICAO’s achievements are not significant compared to IMO’s achievements cannot be entirely accepted. International shipping accounts for approximately 2.2 percent of global CO<sub>2</sub> emissions,<sup>39</sup> which is greater than the CO<sub>2</sub> emissions from international civil aviation, accounting for approximately 2 percent of global CO<sub>2</sub>

---

<sup>33</sup> *Ibid* at 4.

<sup>34</sup> Jacques Hartmann, “A Battle for the Skies: Applying the European Emissions Trading System to International Aviation” (2013) 82:2 *Nordic J Intl L* 187 at 189 [footnote omitted].

<sup>35</sup> At its 62nd Session in July 2011, the IMO Marine Environment Protection Committee adopted mandatory measures to reduce emissions from international shipping. The Committee adopted revisions to Annex VI to the *MARPOL Convention* introducing Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP). See *Amendments to the Annex of the Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto*, Resolution MEPC.203(62), IMO, 62th Sess, Annex 19 (2011) 1, online: IMO <[www.imo.org/en/MediaCentre/HotTopics/GHG/Documents/eedi%20amendments%20RESOLUTION%20MEPC203%2062.pdf](http://www.imo.org/en/MediaCentre/HotTopics/GHG/Documents/eedi%20amendments%20RESOLUTION%20MEPC203%2062.pdf)>.

<sup>36</sup> Clarke & Chagas, *supra* note 25 at 609.

<sup>37</sup> *Ibid* [footnote omitted].

<sup>38</sup> See e.g. ICAO, *Report of the Assessment of Market-Based Measures*, 1st ed, ICAO Doc 10018 (2013) at (vii), online: ICAO <[www.icao.int/Meetings/a38/Documents/10018\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/10018_en.pdf)> [*Report on Market-based Measures*]; Reagan, *supra* note 10 at 383.

<sup>39</sup> See IMO Secretariat, *Reduction of GHG Emissions from Ships: Third IMO GHG Study 2014 – Final Report*, IMO Marine Environment Protection Committee, 67th Sess, Agenda Item 6, Doc MEPC 67/INF.3 (25 July 2014), online: International Association of Drilling Contractors <[www.iadc.org/wp-content/uploads/2014/02/MEPC-67-6-INF3-2014-Final-Report-complete.pdf](http://www.iadc.org/wp-content/uploads/2014/02/MEPC-67-6-INF3-2014-Final-Report-complete.pdf)>.

emissions.<sup>40</sup> With respect to reducing emissions from ships, Annex VI to the *MARPOL Convention*<sup>41</sup> addresses airborne emissions of certain gases from ships, namely sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), ozone depleting substances, and volatile organic compounds.<sup>42</sup> In 2011, the IMO adopted mandatory technical and operational energy efficiency measures for all ships of 400 gross tonnage and above, which entered into force on January 1, 2013 under Chapter 4 of Annex VI,<sup>43</sup> and are expected to significantly reduce CO<sub>2</sub> emissions from international shipping.<sup>44</sup> Nonetheless, the industry, academics, and non-governmental organizations have criticized this “for being a weak measure that will fail to cut CO<sub>2</sub> emissions in absolute terms, at least without complimentary and stringent policy instruments.”<sup>45</sup> In July 2009, the IMO’s Marine Environment Protection Committee [MEPC] at its 59<sup>th</sup> meeting recognized that “technical and operational measures would not be sufficient to satisfactorily reduce the amount of greenhouse gas (GHG) emissions from international shipping in view of the growth projections of world trade”, and, thus, agreed that a market-based measure “was needed as part of a comprehensive package of measure for the effective regulation of [such] emissions”.<sup>46</sup> However, still there is no market-based measure in place for the global maritime industry. At its 65<sup>th</sup> meeting in May 2013, the MEPC agreed to “suspend discussions on [market-based measures] and related issues to a future session.”<sup>47</sup>

In the case of aviation, Volume II of Annex 16 to the *Chicago Convention* addresses smoke,

---

<sup>40</sup> See e.g. ch 2, *above*; *ICAO Res A38-18*, *supra* note 24 at I-68; Air Transport Action Group, “Facts & Figures”, online: ATAG <[www.atag.org/facts-and-figures.html](http://www.atag.org/facts-and-figures.html)> (visited August 21, 2015). But see Motaal, *supra* note 13 at 3–5.

<sup>41</sup> *International Convention for the Prevention of Pollution from Ships*, 2 November 1973, 1340 UNTS 184, UKTS 1983 [*MARPOL*].

<sup>42</sup> See *ibid*, Annex VI.

<sup>43</sup> See *ibid*, Annex VI, ch 4; IMO, Press Briefing, 34, “IMO’s MEPC progresses work on air pollution and energy efficiency” (23 October 2014), online: IMO <[www.imo.org/en/MediaCentre/PressBriefings/Pages/34-mepc-67-emissions.aspx](http://www.imo.org/en/MediaCentre/PressBriefings/Pages/34-mepc-67-emissions.aspx)>. These Regulations have made mandatory the Energy Efficiency Design Index (EEDI) for new ships, and the Ship Energy Efficiency Management Plan (SEEMP) for all ships. See *MARPOL*, *supra* note 41, Annex VI, ch 4.

<sup>44</sup> See IMO, “Air Pollution, Energy Efficiency and Greenhouse Gas Emissions”, online: IMO <[www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Default.aspx](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Default.aspx)>.

<sup>45</sup> Paul Gilbert, “From Reductionism to Systems Thinking: How the Shipping Sector Can Address Sulphur Regulation and Tackle Climate Change” (2014) 43:6 *Marine Policy* 376 at 376–77.

<sup>46</sup> IMO, “Market-Based Measures”, online: IMO <[www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx)> [IMO, “Market-Based”].

<sup>47</sup> *Ibid*.



unburned hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO<sub>x</sub>).<sup>48</sup> ICAO is working on a basket of mitigation measures, which includes technological improvements, operational improvements, sustainable alternative fuels, and market-based measures, that can be used by ICAO Contracting States to mitigate emissions from aviation.<sup>49</sup> Unlike the IMO measures, ICAO measures are not mandatory.<sup>50</sup> Nonetheless, compared to the IMO, ICAO has made major progress in the area of market-based measures. Whereas the IMO considered market-based measures but suspended discussions on the measures,<sup>51</sup> an agreement to develop a global market-based measure for international civil aviation was reached at the 38<sup>th</sup> Session of ICAO Assembly in October 2013.<sup>52</sup> ICAO's work on market-based measures has been discussed in the preceding chapter.<sup>53</sup> Even in such circumstances, the EU has not included the maritime industry, but the aviation industry, in the EU ETS. The European Commission, in June 2013, has merely “set out a strategy for progressively integrating maritime emissions into the EU's policy for reducing its domestic greenhouse gas emissions” consisting of three consecutive steps.<sup>54</sup>

As appears from the latest session – i.e. the 38<sup>th</sup> Session – of the ICAO Assembly, it is not ICAO but its Contracting States that deserve to be blamed for the slow progress in achieving a global solution to combat climate change and global warming from the aviation sector.<sup>55</sup> The differences between developed and developing States on certain issues, e.g., the principle of common but differentiated responsibilities, the principle of special circumstances and respective

---

<sup>48</sup> See ICAO, (2008) 3 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 2, Aircraft Engine Emissions, part III, ch 2, 3.

<sup>49</sup> See ch 3, 4, *above*; ICAO Secretariat, *supra* note 19 at 138.

<sup>50</sup> See e.g. Ahmad, “Environmental”, *supra* note 19.

<sup>51</sup> See IMO, “Market-Based”, *supra* note 46.

<sup>52</sup> See ICAO Res A38-18, *supra* note 24 at I-72.

<sup>53</sup> See ch 4, *above*.

<sup>54</sup> European Commission, “Reducing emissions from the shipping sector”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/transport/shipping/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/shipping/index_en.htm)>. See EC, Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Integrating maritime transport emissions in the EU's greenhouse gas reduction policies*, COM(2013) 479 final, (Brussels: EC, 2013), online: European Commission <[ec.europa.eu/clima/policies/transport/shipping/docs/com\\_2013\\_479\\_en.pdf](http://ec.europa.eu/clima/policies/transport/shipping/docs/com_2013_479_en.pdf)>. These steps are: (a) Monitoring, reporting and verification of CO<sub>2</sub> emissions from large ships using EU ports; (b) Greenhouse gas reduction targets for the maritime transport sector; and (c) Further measures, including MBMs, in the medium to long term. See *ibid*. Simultaneously, to implement the first step, the Commission has “put forward a legislative proposal to establish an EU system for monitoring, reporting and verifying (MRV) emissions from large ships using EU ports.” *Ibid*. See also EC, Commission, *Proposal for a Regulation of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport and amending Regulation (EU) No 525/2013*, COM(2013) 480 final – 2013/0224 (COD) (Brussels: EC, 2013), online: European Commission <[ec.europa.eu/clima/policies/transport/shipping/docs/com\\_2013\\_480\\_en.pdf](http://ec.europa.eu/clima/policies/transport/shipping/docs/com_2013_480_en.pdf)>.

<sup>55</sup> For more discussion on this, see ch 4, *above*; Ahmad, “Environmental”, *supra* note 19.

capabilities, the concept of *de minimis* threshold,<sup>56</sup> and ICAO aspirational goal, are liable for this unacceptable delay.<sup>57</sup> Such divergence of attitudes between developed and developing States is not unique in the field of aviation; this “is evident across the entire economic spectrum.”<sup>58</sup> The EU itself is not unaware of this fact; it also acknowledges this.<sup>59</sup> The developed-developing world polemics are more elaborately addressed in the next chapter.<sup>60</sup>

### **5.3 The authority of the EU to adopt unilateral environmental measures: a brief analysis**

#### **5.3.1 States’ sovereignty over their territorial airspace**

In international law, each State possesses the necessary authority to adopt unilateral measures to the extent that these apply to its sovereign territory.<sup>61</sup> This is primarily due to the doctrine of State sovereignty, according to which every State possesses the right to exercise its functions to the exclusion of other States within its territory.<sup>62</sup> It is a principle of customary

---

<sup>56</sup> According to this concept, airlines will be granted exemption from any proposed national or regional market-based measure on routes to and from developing States whose share of international civil aviation activities is below certain threshold before the implementation of any global market-based measure. See *ICAO Res A38-18*, *supra* note 24 at I-72.

<sup>57</sup> See ch 4, *above*.

<sup>58</sup> Michael Milde, “The EU Emissions Trading Scheme: Confrontation or Compromise?: A Unilateral Action Outside the Framework of ICAO” (2012) 61:2 ZLW 173 at 176 [Milde, “The EU Emissions”].

<sup>59</sup> See e.g. EC, *Communication*, COM(2005) 459 final, *supra* note 16 at 5; EC, Commission, *Commission Staff Working Document: Impact Assessment Accompanying the Document Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowances trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions*, SWD(2013) 430 final (Brussels: EC, 2013), online: European Commission

<[ec.europa.eu/clima/policies/transport/aviation/docs/swd\\_2013\\_430\\_en.pdf](http://ec.europa.eu/clima/policies/transport/aviation/docs/swd_2013_430_en.pdf)> [*Impact Assessment 2013*] (“[t]he spill-overs from the UNFCCC negotiations have complicated the ICAO negotiations” at 10).

<sup>60</sup> See ch 6, *below*.

<sup>61</sup> See Joshua Meltzer, “Climate Change and Trade – The EU Aviation Directive and the WTO” (2012) 15:1 J Intl Econ L 111 at 151–52 (Oxford Journals); Milde, “The EU Emissions”, *supra* note 58 at 178; Kati Kulovesi, “‘Make Your Own Special Song, Even if Nobody Else Sings Along’: International Aviation Emissions and the EU Emissions Trading Scheme” (2011) 2:4 Climate L 535 at 537 (IOS Press). In international law, the “governing principle” is that States cannot adopt measures that have extraterritorial application without the consent of other States or except under the terms of a treaty. See Ian Brownlie, *Principles of Public International Law*, 7th ed (New York: Oxford University Press, 2008) at 309. See also *The Case of the SS “Lotus” (France v Turkey)* (1927), PCIJ (Ser A) No 10 at 18.

<sup>62</sup> See generally Jean Bodin, *Les six livres de la république*, 4th ed (Paris: Chez Jacques du Puys, 1576) at 125; JG Starke, *Introduction to International Law*, 10th ed (London, UK: Butterworths, 1989) at 157; Samantha Besson, “Sovereignty” in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law <[opil.oup.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1472](http://opil.oup.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1472)>; Brownlie, *supra* note 61 at 105–06; Dan Philpott, “Sovereignty” in Edward N Zalta, ed, *The Stanford Encyclopedia of Philosophy* (Summer 2014 Edition), online: Stanford University <[plato.stanford.edu/archives/sum2014/entries/sovereignty/](http://plato.stanford.edu/archives/sum2014/entries/sovereignty/)>; Robert Jackson, *Sovereignty* (Cambridge: Polity Press, 2007) at 1; Sharon Anne Williams & Armand LC de Mestral, *An Introduction to International Law: Chiefly as Interpreted and Applied in Canada*, 2nd ed (Toronto: Butterworths, 1987) at 108. However, some authors do not consider that the concept of sovereignty is a useful one to settle

international law that every State has complete and exclusive sovereignty over the airspace above its territory.<sup>63</sup> The *Chicago Convention*, which is the primary source of public international air law,<sup>64</sup> and is often regarded as the “Constitution”<sup>65</sup> of international civil aviation, has codified this principle of airspace sovereignty,<sup>66</sup> and has defined “territory” as “the land areas and territorial waters adjacent thereto under the sovereignty, suzerainty, protection or mandate of such State.”<sup>67</sup> Article 2 of the *United Nations Convention on the Law of the Sea [UNCLOS]* also confirms sovereignty of coastal States over the airspace above their territorial waters or sea.<sup>68</sup> According to Article 3 of *UNCLOS*, the breadth of territorial sea cannot exceed 12 nautical miles, measured from baselines.<sup>69</sup> In recognition of the principle of airspace sovereignty, Article 6 of the *Chicago Convention* authorizes every State to regulate the entry of foreign aircraft engaged in scheduled international services into its airspace; special permission or authorization is required for aircraft of one Contracting State to operate scheduled international air services over or into the territory of another Contracting State, and such operation must be performed pursuant to the terms of such permission or authorization.<sup>70</sup>

Therefore, the Member States of the EU possess the necessary authority to adopt unilateral environmental measures applicable within their sovereign airspace. However, the EU ETS was not

---

disagreements. See James Crawford, “Sovereignty as a Legal Value” in James Crawford & Martti Koskenniemi, eds, *The Cambridge Companion to International Law* (New York: Cambridge University Press, 2012) 117; Hartmann, *supra* note 34 at 216.

<sup>63</sup> See *Case concerning Military and Paramilitary activities in and against Nicaragua (Nicaragua v United States of America)*, [1986] ICJ Rep 14 at 111 [*Nicaragua Case*]; *ATA v Secretary of State*, *supra* note 9 at I-13885–I-13886; Brownlie, *supra* note 61 at 105.

<sup>64</sup> See generally Michael Milde, *International Air Law and ICAO* in Marietta Benkö, ed, *Essential Air and Space Law*, vol 4 (Utrecht: Eleven International Publishing, 2008) at 17 [Milde, *International*]; Elmar M Giemulla, “Chapter 1: Chicago System: Genesis and Main Characteristics” in Elmar M Giemulla & Ludwig Weber, eds, *International and EU Aviation Law: Selected Issues* (AH Alphen aan den Rijn: Kluwer Law International, 2011) 3 at 5.

<sup>65</sup> See Dempsey, *supra* note 15 at 69; Pablo Mendes de Leon, “Enforcement of the EU ETS: The EU’s Convulsive Efforts to Export its Environmental Values” (2012) 37:4 *Air & Space L* 287 at 289 (Kluwer Law Online).

<sup>66</sup> See *Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295, Can TS 1944 No 36, ICAO Doc 7300/9, art 1 (entered into force 4 April 1947) [*Chicago Convention*]. Prior to the *Chicago Convention*, the principle was codified in article 1 of the *Paris Convention*. See *Convention relating to the Regulation of Aerial Navigation*, 13 October, 1919, 11 LNTS No 297 at 173, art 1 (not in force) [*Paris Convention*].

<sup>67</sup> *Chicago Convention*, *supra* note 66, art 2.

<sup>68</sup> See *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3, UKTS 1999 No 81, art 2 (entered into force 16 November 1994) [*UNCLOS*]. Although the term “territorial sea” is now generally accepted, “[o]ther terms employed to denote the same concept include ‘the maritime belt’, ‘marginal sea’, and ‘territorial waters’.” Brownlie, *supra* note 61 at 173 [footnote omitted].

<sup>69</sup> See *UNCLOS*, *supra* note 68, art 3. *UNCLOS*, *ibid*, art 5, provides that “the normal baseline for measuring the breadth of the territorial sea is the low-water line along the coast as marked on large-scale charts officially recognized by the coastal State.”

<sup>70</sup> See *Chicago Convention*, *supra* note 66, art 6.

launched by the Member States but by the EU which is neither a State nor a Party to the *Chicago Convention*. The EU is a union of 28 Member States, all of whom are ICAO Contracting States. It is a regional organization that is partly intergovernmental and partly supranational, since the Member States have surrendered power in certain areas to the EU.<sup>71</sup> The EU has been conferred legal personality by the Member States.<sup>72</sup> It acts on behalf of its Member States in the pursuit of, *inter alia*, common foreign policies and actions that “ensure sustainable development” and are aimed at helping to “develop international measures to preserve and improve the quality of the environment”,<sup>73</sup> and has been granted competence to “legislate and adopt legally binding acts” in the areas of environment and transport.<sup>74</sup> Hence, the EU possesses the necessary authority to adopt unilateral environmental measures in the area of transport to the extent that these apply within the sovereign territory of the Member States.

However, the EU does not possess the same authority with respect to the three EEA Member States – Iceland, Liechtenstein, and Norway – which are not EU Member States. To be applicable in the EEA, EU legislation must be incorporated into the *EEA Agreement*<sup>75</sup> through EEA Joint Committee Decisions.<sup>76</sup> Moreover, those three States of the European Free Trade Association do not have “formal access to the decision-making process within the EU institutions.”<sup>77</sup> However, at the initial stages of preparing a legislative proposal, those States are permitted to participate in shaping a decision.<sup>78</sup> This authority to participate in decision-shaping suggests that prior consent, albeit informal, is received from those three EEA Member States before passing any EU legislation that will affect those States. In this way, the EU obtains *informal* approval of those EEA States to adopt unilateral environmental measures applicable within the sovereign area of those States, which will be *formally* approved through incorporation into the *EEA Agreement* after enactment of such measures. As noted before, *Directive 2003/87*, which established the EU ETS, and *Directive 2008/101*, which added aviation to the EU ETS, were

---

<sup>71</sup> See e.g. Carleton University Centre for European Studies, “Extension: What Are International Organizations?”, *EU Learning*, online: Carleton University <carleton.ca/ces/eulearning/introduction/what-is-the-eu/extension-what-are-international-organizations/> [Carleton University Centre for European Studies, “Extension”].

<sup>72</sup> See *Consolidated version of the Treaty on European Union*, 7 February 1992, [2012] OJ, C 326/13, arts 1, 47.

<sup>73</sup> *Ibid.*, art 21(2)(f).

<sup>74</sup> *Consolidated version of the Treaty on the Functioning of the European Union*, 25 March 1957, [2012] OJ, C 326/47, arts 2(2), 4(2).

<sup>75</sup> *EEA Agreement*, *supra* note 6.

<sup>76</sup> See EFTA, “The Basic”, *supra* note 6.

<sup>77</sup> *Ibid.*

<sup>78</sup> See *ibid.*

incorporated into the *EEA Agreement* through *Decision 146/2007* and *Decision 6/2011*, respectively.<sup>79</sup>

### **5.3.2 Limits on sovereignty**

It has to be noted that EU's authority to adopt unilateral environmental measures is not unlimited. The Union needs to take into consideration, among others, established aviation law principles, several provisions of the *Chicago Convention*, established international law principles, bilateral and multilateral air transport agreements with non-EEA States, and the World Trade Organization [WTO] rules.

According to Article 11 of the *Chicago Convention*, laws and regulations of a Contracting State concerning admission to or departure from its territory or concerning operation and navigation “while within its territory”<sup>80</sup> of aircraft engaged in international air navigation “shall be applied to the *aircraft of all contracting States without distinction as to nationality*, and shall be complied with by such aircraft upon entering or departing from or while within the territory of that State.”<sup>81</sup> The EU ETS is administered by the Member States, and not by the EU itself.<sup>82</sup> In this regard, the Member States are required to bring into force national laws, regulations, and administrative provision necessary for implementation.<sup>83</sup> Hence, under Article 11 of the *Chicago Convention*, the EU ETS must apply to all aircraft engaged in international air navigation while within the territory of the EEA Member States.

Under the EU ETS, exemption from the application of the scheme is granted to commercial airlines with either fewer than 243 flights per period for three consecutive four-month periods or flights with total annual emissions lower than 10,000 tons of CO<sub>2</sub> per year.<sup>84</sup> However, this exemption clause does not violate Article 11 of the *Chicago Convention*, since the exemption refers to airlines of all nationalities and not to any particular nationality. In fact, *Directive 2008/101* applies to airlines, not to States. However, Scott and Rajamani disagree, arguing that the Directive

---

<sup>79</sup> See EC, *Decision of the EEA Joint Committee No 146/2007 of 26 October 2007 amending Annex XX (Environment) to the EEA Agreement*, [2008] OJ, L 100/92; EC, *Decision of the EEA Joint Committee No 6/2011 of 1 April 2011 amending Annex XX (Environment) to the EEA Agreement*, [2011] OJ, L 93/35.

<sup>80</sup> *Chicago Convention*, *supra* note 66, art 11 [emphasis added].

<sup>81</sup> *Ibid* [emphasis added].

<sup>82</sup> See *Directive 2003/87*, *supra* note 3; *Directive 2008/101*, *supra* note 8.

<sup>83</sup> See *Directive 2003/87*, *supra* note 3 at 41; *Directive 2008/101*, *supra* note 8 at 16.

<sup>84</sup> See *Directive 2008/101*, *supra* note 8 at 17.

applies to States as well.<sup>85</sup> Acceptance of this claim implies that this exemption is contrary to the equality of opportunity and non-discrimination principles of international aviation law.<sup>86</sup> Several provisions and the Preamble of the *Chicago Convention* provide for these principles.<sup>87</sup> States also recognize such principles, as reflected in several working papers submitted by States at the 38<sup>th</sup> Session of the ICAO Assembly,<sup>88</sup> ICAO Assembly Resolutions,<sup>89</sup> and reservations to Resolutions.<sup>90</sup> Therefore, it can be argued that the EU ETS violates this general principle of international aviation law.<sup>91</sup>

However, States must appreciate the following facts. The *Chicago Convention* was signed at a time when environmental costs and benefits were considered incidental to broad economic concerns, e.g., the exploitation of living natural resources.<sup>92</sup> Emissions from aviation “emerged as

---

<sup>85</sup> See Joanne Scott & Lavanya Rajamani, “EU Climate Change Unilateralism” (2012) 23:2 Eur J Intl L 469 at 480 [emphasis in original]:

While the directive does apply to airlines active within the EU market, requiring them to surrender allowances as set out above, it also ‘applies’ to states. It does so because the application of the directive to a business (an airline) depends in part upon the behaviour of the airline’s home state. Where a third country adopts climate mitigation measures that meet the EU’s unilaterally imposed conditions, flights departing from this third country may be excluded from the ETS. The EU’s Aviation Directive is consequently a developed country measure that makes demands both of EU-active businesses *and* of their home states. Thus, when the EU considers granting a partial exemption for incoming flights from the ETS, and when it evaluates the environmental effect of third country measures put in place, the principle of CBDRRC should certainly apply.

<sup>86</sup> See Armand de Mestral & Md Tanveer Ahmad, “Time to Support the EU ETS? – Some issues still need to be resolved”, Policy Brief, Carleton University Canada-Europe Transatlantic Dialogue (March 2014), online: Carleton University <labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/Policy-brief1.pdf> [de Mestral & Ahmad, “Time to Support”] (“[e]nsuring equality of opportunity and non-discrimination is a general principle of international aviation law”).

<sup>87</sup> See e.g. *Chicago Convention*, *supra* note 66, arts 7, 9, 11, 15, 35, 44, Preamble.

<sup>88</sup> See e.g. United Arab Emirates, *UAE’s Views on Aviation and Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 258, Doc A38-WP/258/Ex/85 (9 September 2013), online: ICAO <www.icao.int/Meetings/a38/Documents/WP/wp258\_en.pdf>; Lithuania, *A Comprehensive Approach to Reducing the Climate Impacts of International Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 83, Doc A38-WP/83/Ex/38 (31 July 2013), online: ICAO <www.icao.int/Meetings/a38/Documents/WP/wp083\_en.pdf>.

<sup>89</sup> See e.g. *ICAO Res A38-18*, *supra* note 24; *Consolidated statement of continuing ICAO policies in the air transport field*, ICAO Assembly Res A38-14, 38th Sess, ICAO Doc 10022, III-1, online: ICAO <www.icao.int/publications/Documents/10022\_en.pdf>.

<sup>90</sup> See e.g. Republic of Korea, *Statement of Reservation of the Republic of Korea Regarding Resolution A38-17/2: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate Change* (22 October 2013), online: ICAO <www.icao.int/Meetings/a38/Documents/Resolutions/Korea\_en.pdf>; Australia, *Reservation by Australia to Resolution A38/17/2 on international aviation and climate change*, Reference: ENV 2/1 (5 November 2013), online: ICAO <www.icao.int/Meetings/a38/Documents/Resolutions/Australia\_en.pdf>; United Arab Emirates, *UAE Reservation – Resolution 17/2 Environmental Protection – Climate Change* (4 October 2013), online: ICAO <www.icao.int/Meetings/a38/Documents/Resolutions/UAE\_en.pdf>.

<sup>91</sup> See de Mestral & Ahmad, “Time to Support”, *supra* note 86.

<sup>92</sup> See Catherine Redgwell, “International Environmental Law” in Malcolm D Evans, ed, *International Law*, 3rd ed (New York: Oxford University Press, 2010) 687 at 687.

a problem in the 1970s”,<sup>93</sup> and, hence, the need to protect the environment was not envisaged at the time of negotiation and drafting of the Convention in 1944. As a consequence, no explicit provisions on environmental protection were incorporated therein.<sup>94</sup> In contrast, international environmental law on the protection of the atmosphere is a relatively new area of international law and is still evolving. The principles of equality of opportunity and non-discrimination are archaic, though established, principles, and are enshrined in a treaty, namely the *Chicago Convention*, which does not address a relatively recent global problem – climate change and global warming. Therefore, principles enshrined in this Convention should not appear as barriers to achieving environmental goals – in this case, reducing emissions from aviation that contribute to climate change and global warming.<sup>95</sup>

Article 12 of the *Chicago Convention* can be put forward to question the validity of the EU ETS. Article 12 provides, *inter alia*, that Contracting States have an obligation to adopt measures to ensure that all aircraft (whether national or foreign) flying over or maneuvering within its territory must comply with the rules and regulations concerning the flight and maneuver of aircraft there in force.<sup>96</sup> In these respects, Contracting States undertake to keep their own regulations “uniform, to the greatest possible extent, with those established from time to time under this Convention”.<sup>97</sup> Since no market-based measure has been established under the *Chicago Convention*, the obligation to keep regulations uniform with those established under the Convention cannot be discharged.

Several principles of international environmental law, which have attained the status of customary and/or general international law principles, require States to initiate action to reduce emissions from aviation. It is an established customary international legal principle that States have a sovereign right to exploit their own resources, and simultaneous responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.<sup>98</sup> Since emissions from aviation within

---

<sup>93</sup> Dempsey, *supra* note 15 at 444.

<sup>94</sup> See also ICAO, *The Convention on International Civil Aviation: Annexes 1 to 18*, online: ICAO <[www.icao.int/safety/airnavigation/NationalityMarks/annexes\\_booklet\\_en.pdf](http://www.icao.int/safety/airnavigation/NationalityMarks/annexes_booklet_en.pdf)>.

<sup>95</sup> For more on the principles of equality of opportunity and non-discrimination, see ch 4, *above*.

<sup>96</sup> *Chicago Convention*, *supra* note 66, art 12.

<sup>97</sup> *Ibid.*

<sup>98</sup> See *Trail Smelter Arbitration (United States v Canada)* (1938), 3 RIAA 1905, reprinted in 33 AJIL 182 (Arbitrators: Charles Warren, Robert A E Greenshields, Jan Frans Hostie); *Legality of the Threat or Use of Nuclear Weapons Case*, Advisory Opinion, [1996] ICJ Rep 226 at 241–42; *The Corfu Channel Case*, [1949] ICJ Rep 4; *Award in the Arbitration regarding the Iron Rhine Railway (Belgium v Netherlands)* (2005), ICGJ 373 (Permanent

the territory of States do not respect the national border, and contribute to climate change and global warming wherever they occur, States need to adopt measures to curb such emissions. The international environmental law principle of preventive action, which is a principle of general international law,<sup>99</sup> requires States to adopt measures to prevent “damage to the environment, and otherwise to reduce, limit or control activities that might cause or risk such damage.”<sup>100</sup> Therefore, this principle requires States to adopt preventive measures to reduce emissions from aviation. All of these international law principles should be honored by the EU given its responsibilities, as well as powers conferred by its Member States, to deal with the issue of environmental protection. In one sense, these principles place limits on sovereignty since they impose obligations on States. Alternatively, these principles grant required authority to States to exercise sovereign power to protect the environment. In this sense, these principles confer a positive obligation on the Union to adopt measures to regulate emissions from aviation and, hence, justify the EU’s unilateral action to include aviation in the ETS.

At the 38<sup>th</sup> ICAO Assembly meeting, it was resolved in Resolution A38-18 that States need to engage in consultations and negotiations with other States to reach an agreement when designing new – and implementing existing – market-based measures for international civil aviation.<sup>101</sup>

---

Court of Arbitration) [*Iron Rhine Arbitration*]; *Declaration of the United Nations Conference on the Human Environment*, 16 June 1972, 11 ILM 1416, Principle 21, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?DocumentID=97&ArticleID=1503](http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=97&ArticleID=1503)>; *Rio Declaration on Environment and Development*, UN Doc A/CONF.151/5/Rev.1 (1992), 31 ILM 874, Principle 2, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163)> [*Rio Declaration*]; *The Island of Palmas Case (or Miangas) (United States v Netherlands)* (1928), 11 RIAA 829 (Permanent Court of Arbitration) (Arbitrator: M Huber); “Report of the Commission to the General Assembly on the work of its fifty-third session” (UN Doc A/56/10) in *Yearbook of the International Law Commission 2001*, vol 2, part 2 (New York: UN, 2007) at 148 (UNDOC. A/CN.4/SER.A/2001/Add.1 (Part 2)) [*ILC Report of 53rd Session*]. This principle “already forms the basis for” the *Long-Range Transboundary Air Pollution Convention*, the *Vienna Convention for the Protection of the Ozone Layer*, and the *UN Framework Convention on Climate Change*. Patricia Birnie, Alan Boyle & Catherine Redgwell, *International Law and the Environment*, 3rd ed (New York: Oxford University Press, 2009) at 339. See also Philippe Sands et al, *Principles of International Environmental Law*, 3rd ed (New York: Cambridge University Press, 2012) at 190–200; Michel Adam, “ICAO Assembly’s Resolution on Climate Change: A ‘Historic’ Agreement?” (2011) 36:1 Air & Space L 23 at 28 (Kluwer Law Online).

<sup>99</sup> In the *Iron Rhine Arbitration*, *supra* note 98 at para 59, the arbitral tribunal of the Permanent Court of Arbitration asserted:

Environmental law and the law on development stand not as alternatives but as mutually reinforcing, integral concepts, which require that where development may cause significant harm to the environment there is a duty to prevent, or at least mitigate, such harm... This duty, in the opinion of the Tribunal, has now become a principle of general international law.

In *Case concerning Pulp Mills on the River Uruguay (Argentina v Uruguay)*, [2010] ICJ Rep 14 at 55, para 101, the International Court of Justice [ICJ] pointed out “the principle of prevention, as a customary rule”. See also Sands et al, *supra* note 98 at 200–03.

<sup>100</sup> Sands et al, *supra* note 98 at 200 [footnotes omitted].

<sup>101</sup> See *ICAO Res A38-18*, *supra* note 24 at I-72.



Nevertheless, it should be borne in mind that resolutions are not binding *per se*,<sup>102</sup> and, as mentioned above, EU Member States filed reservations against this provision of the resolution.<sup>103</sup> Nonetheless, the bilateral and multilateral air transport agreements that the EU and the EEA States have with non-EEA States must facilitate the Union's unilateral action in this respect.<sup>104</sup> Therefore, this reservation would not lend any assistance to the EEA States. These States must conclude new bilateral and/or multilateral agreements with non-EEA States, or amend the existing ones, to give way to the application of the EU ETS to non-EEA aircraft, thereby avoiding friction.<sup>105</sup>

The EU must also ensure the compatibility of the EU ETS with its obligations under the WTO rules.<sup>106</sup> It should be noted that one of the retaliatory actions that the non-EEA States have threatened to adopt against the EU ETS is “[d]etermining the consistency of the EU ETS with the WTO Agreements and taking appropriate action”.<sup>107</sup> Hence, ensuring consistency of the scheme with the WTO rules is crucial. Since the main purpose of this chapter is not to determine the validity of the EU ETS against the backdrop of international law, a detailed analysis of WTO rules

---

<sup>102</sup> See e.g. Dinah Shelton, “Soft Law” in David Armstrong, ed, *Routledge Handbook of International Law* (Oxford: Routledge, 2009) 68 at 69–71; Alan Boyle, “Soft Law in International Law Making” in Malcolm D Evans, ed, *International Law*, 2nd ed (Oxford: Oxford University Press, 2006) 141 at 141–43; Milde, *International*, *supra* note 64 at 169; Mark Weston Janis, *International Law*, 6th ed (New York: Wolters Kluwer Law & Business, 2012) at 55.

<sup>103</sup> See Lithuania, *Written Statement*, *supra* note 30.

<sup>104</sup> See also Gilbert Schwarze, “Including Aviation into the European Union’s Emissions Trading Scheme” (2007) 16:1 *Eur Envtl L Rev* 10 at 13 (Kluwer Law Online); Pietro Manzini & Anne Masutti, “The Application of the EU ETS System to the Aviation Sector: From Legal Disputes to International Retaliations?” (2012) 37:4-5 *Air & Space L* 307 at 316 (Kluwer Law Online); Jane Barton, “Tackling Aviation Emissions: the Challenges ahead” (2006) 3:4 *J Eur Envtl & Plan L* 316 at 319 (HeinOnline) [Barton, “Tackling”]. Professor Pablo Mendes de Leon, *supra* note 65 at 291 [footnotes omitted] [emphasis in original], argues:

Arguably, the provisions of the [Directive 2008/101] are liable to affect the *operation* of the agreed international air services as they may impact upon the pricing of the air services, depending on questions like price elasticity and price behaviour, the ability of airlines to manage their variable costs, the capacity which the designated airlines use, frequencies of the operations and in certain instances even upon the points to be served on the agreed routes because of the possible occurrence of the phenomenon of ‘carbon leakage’.

<sup>105</sup> See also de Leon, *supra* note 65 at 292.

<sup>106</sup> Meltzer and Bartels have comprehensively analyzed the compatibility of the EU ETS with the WTO rules. See Meltzer, *supra* note 61; Bartels, *supra* note 12. While Meltzer, *supra* note 61 at 154, “has demonstrated that the application of the [EU ETS] to non-EU airlines raises some important questions about its WTO consistency”, Bartels, *supra* note 12 at 437, argues that, although the scheme will violate those trade rules, such violations “can be justified on environmental grounds under the general exceptions in these agreements”. See also Katelyn E Ciolino, “Up in the Air: The Conflict Surrounding the European Union’s Aviation Directive and the Implications of a Judicial Resolution” (2012–2013) 38:3 *Brook J Intl L* 1151 at 1166 (HeinOnline) (“even if the Directive is justified under GATT Article XX, the EU should refrain from imposing its program on non-EU airlines in the absence of a multilateral agreement on the regulation of aviation emissions” at 1181).

<sup>107</sup> *Joint Declaration of the Moscow Meeting on Inclusion of International Civil Aviation in the EU-ETS*, 22 February 2012, online: GREENAIR <[www.greenaironline.com/photos/Moscow\\_Declaration.pdf](http://www.greenaironline.com/photos/Moscow_Declaration.pdf)> [*Joint Declaration*].

has not been performed.

Thus, it can be concluded from the above discussion that the existing law does not prohibit the implementation of the EU ETS at its amended form, i.e. applying only within the EEA airspace over which the EEA Member States retain sovereignty, provided that:

- (a) it does not contravene any provisions of the existing bilateral and multilateral air transport agreements the EU and/or the EEA States have with non-EEA States; and
- (b) it is consistent with the WTO rules.

## **5.4 Unilateralism, European Union, and the global environment**

### **5.4.1 What is unilateralism?**

Unilateral action for the protection of the environment is not a new phenomenon and has always been a contentious issue.<sup>108</sup> The protection of the environment “is a breeding ground for unilateral measures.”<sup>109</sup> However, the term “unilateralism” is so disliked that characterizing “an action as ‘unilateral’ is to condemn it.”<sup>110</sup> In such cases, the trend is to regard such actions as illegitimate, without even determining their legitimacy.<sup>111</sup> Unsurprisingly, the EU ETS suffers from the same difficulty. As a consequence, this unilateral action encountered so much resistance from the non-EEA States that the EU had to amend its ETS, keeping its geographic scope within the airspace of the EEA Member States. It should be noted that this is not the first time that the EU has initiated a unilateral action to protect the environment in the area of aviation. Previously, the Union unilaterally initiated action to restrict noise emissions from aviation, which did not fare well with the United States [US] since implementation of such noise restriction would hit the US flag

---

<sup>108</sup> See e.g. Daniel Bodansky, “What’s So Bad about Unilateral Action to Protect the Environment?” (2000) 11:2 Eur J Intl L 339; Richard B Bilder, “The Role of Unilateral State Action in Preventing International Environmental Injury” (1981) 14 Vand J Transnat’l L 51 (HeinOnline) [Bilder, “The Role”]; Richard B Bilder, “The Canadian Arctic Waters Pollution Prevention Act: New Stresses on the Law of the Sea” (1970–1971) 69:1 Mich L Rev 1 (HeinOnline); Philippe Sands, “‘Unilateralism’, Values, and International Law” (2000) 11:2 Eur J Intl L 291 at 293–94 [Sands, “Unilateralism”]; Laurence Boisson de Chazournes, “Unilateralism and Environmental Protection: Issues of Perception and Reality of Issues” (2000) 11:2 Eur J Intl L 315 at 319–21; Hartmann, *supra* note 34 at 217.

<sup>109</sup> de Chazournes, *supra* note 108 at 325.

<sup>110</sup> Bodansky, *supra* note 108 at 339. See e.g. de Chazournes, *supra* note 108 at 318. However, Bertele and Mey consider that the term “unilateralism” is “applauded or criticized – depending on one’s stand.” Manfred Bertele & Holger H Mey, “Unilateralism in Theory and Practice” (1998) 17:2 Comparative Strategy 197 at 197 (Taylor & Francis Online). For example, Professor Seigfried, who criticizes the US’s unilateral action of invading Iraq, asserts that “[u]nilateralism is underpinned by a naive belief in one’s goodness and a reflexive chauvinism”. Charlene Haddock Seigfried, “The Dangers of Unilateralism” (2006) 18:3 NWSA J 20 at 27 (JSTOR).

<sup>111</sup> See Bodansky, *supra* note 108 at 339. See also de Chazournes, *supra* note 108 at 320.

carrier Northwest Airlines hardest.<sup>112</sup>

Several authors have attempted to define unilateralism in different ways, since no single legal definition of the term “unilateralism” exists.<sup>113</sup> For example, according to Bertele and Mey, “unilateralism can be described as an overarching method”, i.e. “a particular method by which a state or political actor interacts with the international environment”.<sup>114</sup> In other words, it is a method by which a State or political actor resolves “its international problems and manages its relations with partners and opponents.”<sup>115</sup> Unilateralism is, according to them, “more than an orientation that maximizes self-interest[;] it is a principle for action aimed at limiting commitments while maintaining autonomy of action.”<sup>116</sup> They point out that each political act, at least in the area of foreign and security policy, commences as “a one-sided and unilateral act”, since, behind every political act, there “is a unilateral definition of one’s own interests.”<sup>117</sup> In contrast to unilateralism, multilateralism “emphasizes common matters”.<sup>118</sup> Similarly, according to de Chazournes, “unilateralism, as broadly defined, is generally perceived as being part of the ‘normality’ of international relations: it is understood as a means of exercising sovereign rights.”<sup>119</sup> The nexus between unilateralism and international relations was also noted by Jennings and Watts. According to them, “[t]ransactions other than negotiations and treaties fall generally into the broad category of unilateral acts, [i.e.] acts performed by a single state, which nevertheless have effects upon the legal position of other states, particularly (but not exclusively) in their relations with the actor state.”<sup>120</sup> In a different fashion, Kuzmarov considers that unilateral acts are “political acts which may contribute to the formation of law, but are themselves outside of the law.”<sup>121</sup>

It appears that, though sharing few common features, these definitions differ from each other. Professor Philippe Sands aptly notes that, at the international level, unilateralism “is a term of art” for three reasons: the issues are not constructed “in terms of international constitutional

---

<sup>112</sup> For further discussion, see Dempsey, *supra* note 15 at 425–26, 711–19; Section 5.4.4, *below*.

<sup>113</sup> See Bernhard Jansen, “The Limits of Unilateralism from a European Perspective” (2000) 11:2 *Eur J Intl L* 309 at 309; de Chazournes, *supra* note 108 at 315.

<sup>114</sup> Bertele & Mey, *supra* note 110 at 198.

<sup>115</sup> *Ibid.*

<sup>116</sup> *Ibid.*

<sup>117</sup> *Ibid.*

<sup>118</sup> *Ibid.*

<sup>119</sup> de Chazournes, *supra* note 108 at 316.

<sup>120</sup> Sir Robert Jennings & Sir Arthur Watts, eds, *Oppenheim’s International Law*, 9th ed (Harlow, Essex: Longman, 1992) vol 1, parts 2-4 at 1187–88 [footnote omitted].

<sup>121</sup> Betina Kuzmarov, “Unilateral Acts in International Relations: Accepting the Limits of International Law” (2005) 8:1 *YB NZ Jurisprudence* 77 at 96 (HeinOnline).

authority,” “the territorial limits to the exercise of sovereign autonomy remain in a state of flux,” and “the standards set by international law remain incomplete in many areas and ambiguous and open textured in many others.”<sup>122</sup> Nonetheless, reading all the above definitions together, unilateralism can be defined in the following way: Unilateralism is a political act of a single State in the exercise of its sovereign rights, which is adopted mainly (but not exclusively) to maximize its self-interest, and has effects upon the legal position of foreign States though those States have not consented to such effects. Furthermore, unilateral acts may be outside of the law but can contribute to the formation of law. What matters, therefore, is the consent of foreign State(s), though none of these definitions specifically mention that. In the absence of mutual agreement, the actions of any State that can affect the actions and legal positions of foreign States can be termed as unilateral actions. However, as discussed below, since unilateralism can be classified in several ways, it is not necessary that an action must affect the actions of foreign States to be categorized as a unilateral one. Moreover, it should be noted that, in the area of environmental protection, such actions often maximize the interest of other States or international community at large. A better environment will benefit the global community – the State(s) taking the unilateral action, the States affected by that action, and even the States that are not affected by the action.

Although these definitions consider only acts of an individual State, unilateral actions can be adopted by different actors, such as groups of States, regional organizations, international organizations, and non-governmental organizations.<sup>123</sup> This chapter concerns the unilateral action of the EU, a regional organization of States, which is partly intergovernmental and partly supranational,<sup>124</sup> in the field of environmental protection. Inclusion of aviation in the EU ETS is considered a unilateral act, since the flag carriers of non-EEA States were included in the scheme without the consent of those States.

---

<sup>122</sup> Sands, “Unilateralism”, *supra* note 108 at 293.

<sup>123</sup> See de Chazournes, *supra* note 108 at 317–18; Gregory Shaffer & Daniel Bodansky, “Transnationalism, Unilateralism and International Law” (2012) 1:1 *Transnational Environmental L* 31.

<sup>124</sup> An intergovernmental organization “is composed of nation-states and it promotes voluntary co-operation and coordination among its members.” John McCormick, *The European Union: Politics and Policies*, 2nd ed (Boulder, Colo: Westview Press, 1999) at 10. However, decisions and agreements reached in an intergovernmental organization cannot be enforced, since the members do not surrender any power. In contrast, with respect to supranational organizations, Member States “do surrender power in specific areas to the higher organization”, hence Member States must obey any decision taken by such organizations. See Carleton University Centre for European Studies, “Extension”, *supra* note 71.

### **5.4.2 Classification of unilateralism**

Several classifications of unilateralism are possible. According to Bertele and Mey, unilateral actions can take one of two forms: passive unilateralism and active unilateralism.<sup>125</sup> De Chazournes identified three facets of unilateralism, namely the “normative” facet, the “policy-forging” facet, and the “implementation and enforcement” facet.<sup>126</sup> Unilateral acts, “such as promises, declarations, protests or recognitions as generating rights or obligations,” fall within the “normative” facet of unilateral acts.<sup>127</sup> Unilateral actions, which endeavor to “shape a given legal regime and its application in a way that is more” consistent with the interests that the State(s) adopting the action endeavors to defend, fall within the “policy-forging” facet of unilateralism.<sup>128</sup> The unilateral claim by an individual State or group of States of “the capacity or even the right to enforce rules, either in its own interests or in those of the international community as a whole”, falls within the “implementation and enforcement” facet of unilateralism.<sup>129</sup> In this regard, “it is important to distinguish unilateral action taken within the framework of a given legal structure which itself authorizes (or at least tolerates) such action, from behaviour which ignores, bends or contravenes...applicable rules.”<sup>130</sup> De Chazournes argues that the “policy-forging” and the “implementation and enforcement” facets “appear to raise more contentious issues.”<sup>131</sup> Jennings and Watts have noted several types of unilateral acts that include four general kinds: declarations, notifications, protests, and renunciation.<sup>132</sup>

In the realm of environmental protection, unilateralism can be classified in six ways, as Bilder has identified. These are: “the motive of the state taking unilateral action”;<sup>133</sup> the “location of [the] principal and immediate effect” of unilateral actions; “the relative duration or permanence of the [unilateral] action”; “the nature of the environmental threat to which [the unilateral actions] are ostensibly a response”; the impact of the unilateral actions on the interests of other States;<sup>134</sup> and the “apparent consistency or inconsistency [of the unilateral actions] with present or emerging

---

<sup>125</sup> See Bertele & Mey, *supra* note 110 at 199–200.

<sup>126</sup> de Chazournes, *supra* note 108 at 316–17.

<sup>127</sup> *Ibid* at 316 [footnote omitted].

<sup>128</sup> *Ibid* at 317.

<sup>129</sup> *Ibid* at 316.

<sup>130</sup> *Ibid*.

<sup>131</sup> *Ibid* at 317.

<sup>132</sup> See Jennings & Watts, *supra* note 120 at 1188.

<sup>133</sup> Bilder, “The Role”, *supra* note 108 at 59.

<sup>134</sup> *Ibid* at 61.

international law”.<sup>135</sup> These actions can be further classified, according to Bilder, into five types in terms of motivation of the State:

1. Actions “primarily intended to protect the state’s own territory or jurisdiction”,<sup>136</sup>
2. Actions “primarily intended to protect the territories or nationals of other states from threats of environmental injury” that arise chiefly from the activities of the State taking the action or its citizens while under its jurisdiction;<sup>137</sup>
3. Actions “primarily intended to protect certain international environments...from threats of environmental injury” which arise mainly from the activities of the State adopting the action or its citizens while within its territory or jurisdiction;<sup>138</sup>
4. Actions “primarily intended to protect the acting state’s own territory and nationals from threats of environmental injury” that arise mainly from the activities of foreign States or their citizens;<sup>139</sup> and
5. Actions “primarily intended to protect the territory of other states, international regions..., or broader international community environmental concerns from threats of environmental injury” which arise chiefly from the activities of other States or their citizens.<sup>140</sup> In this instance, the State acts to “protect foreign states, the international commons, or the global environment as a whole from the environmentally harmful activities of others.”<sup>141</sup>

The actions of more than one State, where they adopt such actions as a group or through a competent regional organization like the EU, can be classified in the same way.

It is the last two classes of unilateral actions that give rise to controversy, since these actions endeavor to control the actions of foreign States or their nationals without negotiation or, if there was negotiation, without their consent.<sup>142</sup> It is contended that such unilateral actions represent “a kind of hegemony and imperialism.”<sup>143</sup> While the EU ETS falls within all the classes delineated above, extension of the scheme to airlines of non-EEA States falls within the last two classes. Such an extension would attempt to regulate the activities of the airlines from non-EEA States in order

---

<sup>135</sup> *Ibid* at 62.

<sup>136</sup> *Ibid* at 59.

<sup>137</sup> *Ibid*.

<sup>138</sup> *Ibid* at 59–60.

<sup>139</sup> *Ibid* at 60.

<sup>140</sup> *Ibid*.

<sup>141</sup> *Ibid*.

<sup>142</sup> See also *ibid*; Bodansky, *supra* note 108 at 341; Sands, “Unilateralism”, *supra* note 108 at 292–93.

<sup>143</sup> Bodansky, *supra* note 108 at 341.

to protect the territory and citizens of EEA Member States, as well as the broader international community, from the danger of climate change and global warming.

### **5.4.3 A brief comparison between unilateralism and multilateralism**

Both unilateralism and multilateralism have their advantages and disadvantages.<sup>144</sup> In multilateralism, the chief advantage is that multilateral actions can more effectively protect the environment than unilateral actions, since the necessary element of State consent is present. In such a circumstance, the question of extraterritorial application does not arise, and friendly and harmonious relationships among States are preserved. Compared to unilateral actions, “the scope, intensity and geographic extent”<sup>145</sup> of multilateral actions can be extensive. Through multilateral environmental agreements, new environmental legal norms/values in international environmental law can acquire recognition from States, and such norms can then be used in national and regional environment-related schemes.<sup>146</sup>

However, the prime disadvantage of seeking a multilateral regime is that the process is slow; it takes years, sometimes decades, to agree on a solution that is acceptable to all States. Obtaining the necessary political will is a complicated process. Frequently, States fail to agree on any effective solution. One vivid example is the failure of States to agree on a binding post-Kyoto Protocol regime. Even when concluded, multilateral measures “often result in weak standards, which commit states to do little if anything more than they intended to do anyway.”<sup>147</sup> For example, in the case of global climate change regime, which comprises the *UNFCCC* and the *Kyoto Protocol*,<sup>148</sup> the *UNFCCC* did not establish any quantitative commitments to limit greenhouse gas emissions; it “ultimately established only an aspirational commitment from industrialized

---

<sup>144</sup> See generally Bilder, “The Role”, *supra* note 108 at 79–86; Bodansky, *supra* note 108; Ruwantissa Abeyratne, “Emissions Trading – Recommendations of CAEP/7 and the European Perspective” (2007) 32:4-5 *Air & Space L* 358 at 367–68 (Kluwer Law Online); Bertele & Mey, *supra* note 110; Shaffer & Bodansky, *supra* note 123; Ciolino, *supra* note 106; Md Tanveer Ahmad, “Achieving Global Safety in Civil Aviation: A Critical Analysis of Contemporary Safety Oversight Mechanisms” (2012) 37 *Ann Air & Sp L* 81 [Ahmad, “Achieving”]; José E Alvarez, “Multilateralism and Its Discontents” (2000) 11:2 *Eur J Intl L* 393 (“[b]oth unilateral and multilateral approaches can serve the ‘public interest’ and both can fail” at 408).

<sup>145</sup> Bertele & Mey, *supra* note 110 at 200.

<sup>146</sup> See Ciolino, *supra* note 106 (“[e]ven non-binding multilateral environmental agreements can play a role in developing “recognition of environmental values”” at 1183).

<sup>147</sup> Shaffer & Bodansky, *supra* note 123 at 32–33.

<sup>148</sup> *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, Can TS 1994 No 7 (entered into force 21 March 1994) [*UNFCCC*]; *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 162 (entered into force 16 February 2005) [*Kyoto Protocol*].

countries to control these emissions in the future.”<sup>149</sup> Unlike the *UNFCCC*, the *Kyoto Protocol* established quantitative restrictions on emissions from industrialized economies, which mended the weakness of the *UNFCCC*.<sup>150</sup>

In contrast to multilateralism, unilateralism does not suffer from this slow process. Unilateral measures can influence other States to change their policies.<sup>151</sup> Unilateralism can trigger actions from other States, often resulting in a multilateral action/regime or the development of customary norm for the protection of the environment.<sup>152</sup> From this perspective, the State(s) taking unilateral action acts like a norm entrepreneur,<sup>153</sup> and “gains a first-mover advantage by its ability to use its norms to define the problem at issue and propose a solution.”<sup>154</sup> Interestingly, Fox suggests that the development of a multilateral agreement is often contingent upon “the strategic use of [unilateral] trade measures during the negotiation and implementation of such an

---

<sup>149</sup> Sean T Fox, “Responding to Climate Change: The Case for Unilateral Trade Measures to Protect the Global Atmosphere” (1996) 84:7 *Geo LJ* 2499 at 2499 [footnote omitted] (HeinOnline). *UNFCCC*, *supra* note 148, art 2, provides:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system[.]

<sup>150</sup> *Kyoto Protocol*, *supra* note 148, art 3(1), requires Annex I Parties to ensure, individually or jointly, that: [T]heir aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B...with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the [first] commitment period 2008 to 2012.

Also, according to *Kyoto Protocol*, *ibid*, art 3(2), “[e]ach Party...shall, by 2005, have made demonstrable progress in achieving its commitments under this Protocol.”

<sup>151</sup> See Ciolino, *supra* note 106 at 1183.

<sup>152</sup> See Bodansky, *supra* note 108 at 344–46 (“unilateral action can play a catalytic role in the development of an international regime” at 339); Reagan, *supra* note 10 at 380. See also Fox, *supra* note 149; de Chazournes, *supra* note 108 at 319–20. Interestingly, Kuzmarov, *supra* note 121 at 95, argues that, although unilateral acts represent such prospect, “they are not in and of themselves “legal”.”

<sup>153</sup> The concept of “norm entrepreneurship” was introduced by Professor Sunstein who calls “norm entrepreneurs” those people who are “interested in changing social norms”. See Cass R Sunstein, “Social Norms and Social Roles” (1996) 96:4 *Colum L Rev* 903 at 909 (JSTOR). Professor Sunstein states that “[e]xisting social conditions are often more fragile than might be supposed, because they depend on social norms to which... people may not have much allegiance [and] *norm entrepreneurs*... can exploit this fact.” *Ibid* [emphasis in original]. Individuals “who favor changes in norms face a free rider problem; norm entrepreneurs can alert people to the existence of a shared complaint and can suggest a collective solution.” *Ibid* at 929. According to Sunstein, ““norm entrepreneurs” can help solve collective action problems”. *Ibid* at 968. Moreover, “[p]rivate groups can test or even change norms. Indeed, the testing of current norms, meanings, and roles is a crucial function of groups that are intermediate between citizens and the state. Religious groups are in this sense norm entrepreneurs; the same is true for environmental and civil rights organizations.” *Ibid* at 947. He describes Martin Luther King, Jr., William Bennett, Louis Farrakhan, Catharine MacKinnon, Ronald Reagan, and Jerry Falwell as norm entrepreneurs. See *ibid* at 929.

<sup>154</sup> Ciolino, *supra* note 106 at 1188 [footnotes omitted].



agreement.”<sup>155</sup> Hence, proponents of unilateralism equate this strategy with leadership,<sup>156</sup> and argue that the EU’s unilateral initiative to include aviation in the EU ETS “reflects a move towards a leadership style”.<sup>157</sup> Thus, in the field of international environmental law, a relatively new branch of international law, unilateralism can be viewed as a blessing when States fail to agree on a multilateral regime necessary to protect the environment.<sup>158</sup>

Nonetheless, unilateral actions frequently encounter opposition from foreign States and can mar the motivation of other States to engage in multilateral discussion to reach an effective solution.<sup>159</sup> In this regard, the geographical scope of unilateral action becomes limited to the territory of the State(s) initiating the action, which happened to the EU ETS with respect to aviation. The scope and intensity of such measures become limited as well. For example, in the case of the EU ETS, the Union could not execute its plan to extend the scheme to include aviation emissions of nitrogen oxides (NO<sub>x</sub>),<sup>160</sup> since the original scheme addressing only CO<sub>2</sub> emissions encountered massive resistance from non-EEA States. Moreover, implementation of the EU ETS to airlines of non-EEA States had to be suspended in the very first year of its application, in response to political pressure.<sup>161</sup> Climate change and global warming are global problems, and can be exacerbated through the emissions of greenhouse gases occurring anywhere in the world. Again, CO<sub>2</sub> is not the only greenhouse gas that drives these processes.<sup>162</sup>

---

<sup>155</sup> Fox, *supra* note 149 at 2501.

<sup>156</sup> See e.g. Bertele & Mey, *supra* note 110; Bodansky, *supra* note 108. However, Bertele & Mey, *supra* note 110 at 200, warned that “[s]uch leadership is not without risk. If leadership becomes excessive, it can lead to the buildup of resisting forces and can destroy a coalition... At the same time, too little leadership can make it impossible to actively pursue common interests – the alliance becomes useless.”

<sup>157</sup> Kulovesi, *supra* note 61 at 541–42.

<sup>158</sup> In the area of global climate change, Fox, *supra* note 149, argues and demonstrates that unilateral environmental trade measures are especially appropriate.

<sup>159</sup> Bertele & Mey, *supra* note 110 at 198, argue that “unilateralism in the sense of complete freedom of action without commitment to compromise or cooperation is largely counterproductive.” They, *ibid* at 198, refer to two reasons for this outcome: “First of all, not even the most powerful states are immune to the resistance of others. Second, many of today’s new, global challenges are best addressed cooperatively.” See also Ciolino, *supra* note 106 at 1187; Reagan, *supra* note 10 at 382. Abeyratne, *supra* note 144 at 368, states:

As for drawbacks, the [unilateral] approach has the disadvantage that it may be disputed, with potential consequential delays and/or lack of uniformity. It could also encourage aircraft operators to avoid the Scheme, which could also potentially lead to competitive distortion, trade disruptions and an increase in emissions. The application of this approach, which may be appropriate for a State or group of States, may not be appropriate for other States given the divergent approaches and circumstances of different States.

<sup>160</sup> See *Directive 2008/101*, *supra* note 8 at 5–6.

<sup>161</sup> See ch 3, *above*.

<sup>162</sup> See Ulrich Cubasch et al, “Introduction” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 119 at 123–29.

To redress global environmental problems, we need measures that have the potential to effectively address those problems. To be effective, such measures should, among others, set robust standards, have extensive scope, intensity, and geographic extent, and have more participation of States. To address issues like climate change and global warming that are happening at a much greater speed than before, such measures have to be adopted and implemented without further delay. It can be observed from the above comparison that multilateralism can be more effective than unilateralism in addressing global environmental problems, since the former can have wider scope, intensity, and geographic extent, and have more participation of States. Hence, multilateral actions should be preferred to unilateral ones in addressing climate change and global warming, which are global issues. Nonetheless, unilateralism should not be abandoned. Multilateralism often sets weak standards, and the processes involved to reach multilateral agreements are very slow. Hence, in the absence of strong standards or multilateral agreements to deal with global environmental issues that warrant immediate vigorous action, States, especially economically powerful ones, should take the lead by resorting to unilateralism to combat those issues. In this respect, those States should ensure that their unilateral moves drive forward, not frustrate, multilateral processes.

#### **5.4.4 EU unilateralism: the case of noise emissions from aviation**

As previously mentioned, the EU had previously acted unilaterally in the field of aviation to regulate aircraft noise before it adopted *Directive 2008/101* to include aviation in the EU ETS. Did that action successfully produce the international regime or standard that the EU Member States were looking for? ICAO noise standards are promulgated under Volume I of Annex 16 to the *Chicago Convention*.<sup>163</sup> In 1999, the EU passed *Regulation 925/1999*,<sup>164</sup> which sought “to ban hushkitted aircraft which had been recertified as compliant with Chapter 3 of [Volume I of] Annex 16 from its territory.”<sup>165</sup> Thus, by this Regulation, the EU attempted to set higher “standards for noise emissions than the ICAO standards...demand.”<sup>166</sup> This contravenes Article 33 of the

---

<sup>163</sup> For ICAO noise standards, see ICAO, (2014) 7 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 1, Aircraft Noise [*Annex 16: Volume 1*].

<sup>164</sup> EC, *Council Regulation (EC) 925/1999 of 29 April 1999 on the registration and operation within the Community of certain types of civil subsonic jet aeroplanes which have been modified and recertificated as meeting the standards of volume I, Part II, Chapter 3 of Annex 16 to the Convention on International Civil Aviation, third edition (July 1993)*, [1999] OJ, L 115/1.

<sup>165</sup> Dempsey, *supra* note 15 at 425.

<sup>166</sup> *Ibid* at 712 [footnote omitted].

*Chicago Convention* that requires ICAO Contracting States to meet minimum standards.<sup>167</sup> Such a move would hit the US flag carrier Northwest Airlines hardest since that carrier “had invested most heavily in “hushkitting”, rather than replacing, its aging fleet”.<sup>168</sup> A dispute arose between the US and the EU, and, on March 14, 2000, the US filed a formal complaint with the ICAO Council against the EU Member States under Article 84 of the *Chicago Convention*.<sup>169</sup> Since the EU is not and cannot be a Party to the *Chicago Convention*,<sup>170</sup> the complaint was filed against the EU Member States, and not against the Union.

The ICAO Council denied all objections that were raised by the EU Member States, but did not comment on the validity of the Regulation.<sup>171</sup> Consequently, these Member States filed their counter-memorial instead of opting to appeal the Council’s decision to the International Court of Justice.<sup>172</sup> In response, both parties were invited by the ICAO Council’s order “to resume negotiations to resolve the dispute”, and they agreed.<sup>173</sup> Finally, in 2001, the US and the EU reached an agreement; the EU backed off by repealing *Regulation 925/1999* and by enacting *Directive 2002/30*,<sup>174</sup> and the US withdrew its complaint.<sup>175</sup> In June 2001, the ICAO Council updated Annex 16, Volume I, by adopting a new noise standard, namely Chapter 4.<sup>176</sup> Nevertheless, the updates did not ban hushkitted aircraft as desired by the EU. Even today, aircraft can be hushkitted to meet the ICAO standard.<sup>177</sup> This can be viewed as a failure of the Union to

---

<sup>167</sup> See *Chicago Convention*, *supra* note 66, art 33. See also Dempsey, *supra* note 15 at 426.

<sup>168</sup> Dempsey, *supra* note 15 at 714 [footnote omitted]. Old aircraft engines are retrofitted with a device called a hush kit to reduce the engines noise emissions. This process of retrofitting is frequently referred to as “hushkitting”. Most hushkits “address the process by which high-velocity hot jet exhaust clashes with cooler ambient air, generating the thunderous roar associated with jets. Slowing that exhaust, or spreading out the area in which the rumble takes place, is the goal. Sound-absorbing materials...enclose not only the exhaust but also the engine fan and intake cowl to reduce the noise projected forward.” Roger A Mola, “Hush Kits: Engineer to airplane: Stifle”, *Air & Space Magazine* (January 2005), online: Air & Space Smithsonian <[www.airspacemag.com/how-things-work/hush-kits-8747402/](http://www.airspacemag.com/how-things-work/hush-kits-8747402/)>.

<sup>169</sup> See Dempsey, *supra* note 15 at 714; *Chicago Convention*, *supra* note 66, art 84.

<sup>170</sup> See *Chicago Convention*, *supra* note 66, arts 91–93 (only States can become Parties to the Convention).

<sup>171</sup> See Dempsey, *supra* note 15 at 426, 717–18.

<sup>172</sup> See *ibid* at 718.

<sup>173</sup> *Ibid*.

<sup>174</sup> EC, *Directive 2002/30/EC of the European Parliament and of the Council of 26 March 2002 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports*, [2002] OJ, L 85/40.

<sup>175</sup> See Dempsey, *supra* note 15 at 426, 718.

<sup>176</sup> See e.g. Joana Chiavari, Sirini Withana & Marc Pallemarts, “The Role of the EU in Attempting to ‘Green’ the ICAO”, Environmental Policy Integration and Multi-Level Governance Paper No 35 (2009) at 24, online: Basque Ecodesign Center <[www.basquecodesigncenter.net/Documentos/Noticias/DEE85B2F-4AC2-4F04-9774-8ABFB9E11881/EPIGOV\\_PAPER\\_35\\_CHIAVARI\\_ET\\_AL.PDF](http://www.basquecodesigncenter.net/Documentos/Noticias/DEE85B2F-4AC2-4F04-9774-8ABFB9E11881/EPIGOV_PAPER_35_CHIAVARI_ET_AL.PDF)>.

<sup>177</sup> See *Annex 16: Volume I*, *supra* note 163, c 14; *Consolidated statement of continuing ICAO policies and practices related to environmental protection – General provisions, noise and local air quality*, ICAO Assembly

achieve its goal of banning hushkitted aircraft by its unilateral action. Is the EU heading in the same direction with respect to the EU ETS?

#### **5.4.5 Response to the EU's unilateral inclusion of aviation in the EU ETS**

The EU claims that aviation has been included in the ETS to discharge it of its responsibilities to reduce greenhouse gas emissions from aviation.<sup>178</sup> According to the EU, such responsibilities arise from the following: the objective of the *UNFCCC* to stabilize greenhouse gas concentrations in the atmosphere;<sup>179</sup> the requirement under the *UNFCCC* to formulate and implement national and, where appropriate, regional programs containing climate change mitigation measures;<sup>180</sup> EU's "firm independent commitment...to reduce its greenhouse gas emissions to at least 20% below 1990 levels by 2020";<sup>181</sup> and the *Kyoto Protocol* that requires Annex I developed States to pursue the limitation or reduction of greenhouse gas emissions from aviation, working through ICAO.<sup>182</sup> Reducing greenhouse gas emissions from aviation, the EU believes, will essentially contribute to meeting the Union's own firm independent commitment.<sup>183</sup> To bolster its position with respect to *Kyoto Protocol*, the EU has referred to the slow progress of ICAO processes, and the failure of such processes to develop a market-based measure for international civil aviation.<sup>184</sup> In fact, the EU ETS was launched to more effectively contribute to fulfilling the commitments of the Union and its Member States under the *Kyoto Protocol*.<sup>185</sup>

However, the EU's claim has failed to please non-EEA States for various reasons. These include: the *UNFCCC* does not specifically address emissions from aviation; non-EEA States cannot be made subject to EU's own commitment; only Annex I developed State Parties to the

---

Res A38-17, 38th Sess, ICAO Doc 10022, I-54 at I-62, I-63, I-64, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)>.

<sup>178</sup> See *Directive 2008/101*, *supra* note 8 ("[t]he objective of the amendments made to Directive 2003/87/EC by this Directive is to reduce the climate change impact attributable to aviation by including emissions from aviation activities in the Community scheme" at 5).

<sup>179</sup> See *ibid* at 3.

<sup>180</sup> See *ibid* at 4.

<sup>181</sup> *Ibid* at 3. Recently, the EU has made another firm binding commitment to reduce EU's domestic greenhouse gas emissions by at least 40 percent below the 1990 levels by 2030. See European Commission, "2030 climate & energy framework", online: European Commission Climate Action <[ec.europa.eu/clima/policies/strategies/2030/index\\_en.htm](http://ec.europa.eu/clima/policies/strategies/2030/index_en.htm)>.

<sup>182</sup> See *Directive 2008/101*, *supra* note 8 at 4.

<sup>183</sup> See *ibid* at 3.

<sup>184</sup> See *ibid* at 4.

<sup>185</sup> See *Directive 2003/87*, *supra* note 3 at 32.

*Kyoto Protocol* have an obligation that has to be discharged working through ICAO;<sup>186</sup> developing States cannot be made subject to the EU ETS in recognition of the principle of common but differentiated responsibilities;<sup>187</sup> not all States, particularly the US and Canada, are Parties to the *Kyoto Protocol*;<sup>188</sup> and the EU ETS originally had extraterritorial scope.<sup>189</sup> Worth mentioning is the fact that the issue of extraterritorial application of the scheme was the main reason why States objected to the inclusion of aviation in the EU ETS.<sup>190</sup> However, according to the latest amendments, the scheme will not have extraterritorial effect until the end of 2016. Only emissions from flights between aerodromes situated in the territory of EEA Member States will be covered during that period.

The decision to include aviation in the EU ETS spurred opposition and protest from many governments, airlines, and trade associations.<sup>191</sup> Those responses came both collectively and individually. The following three subsections provide a brief list of those responses.

#### **5.4.5.1 Response from States**

Several States objected to the inclusion of non-EEA airlines in the EU ETS “as a violation of their sovereignty.”<sup>192</sup> States collectively pursued the following actions:

- In September 2011, twenty-six States,<sup>193</sup> including Brazil, Russia, China, India, South

---

<sup>186</sup> See *Kyoto Protocol*, *supra* note 148, art 2(2).

<sup>187</sup> See e.g. Hua Lan, “Comments on EU Aviation ETS Directive and EU – China Aviation Emission Dispute” (2011) 45:3 RJT 589 (HeinOnline); Scott & Rajamani, *supra* note 85.

<sup>188</sup> See UNFCCC, “Status of Ratification of the Kyoto Protocol”, online: UNFCCC <[unfccc.int/kyoto\\_protocol/status\\_of\\_ratification/items/2613.php](http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php)> (the US never ratified the Kyoto Protocol, and Canada withdrew from the instrument on December 15, 2011 that became effective on December 15, 2012).

<sup>189</sup> See e.g. Christina Voigt, “Up in the Air: Aviation, the EU Emissions Trading Scheme and the Question of Jurisdiction” (2011–2012) 14 Cambridge YB Eur Leg Stud 475 at 483ff.

<sup>190</sup> See also Ines Litzengerger, “Trade War in the Skies: *Air Transport Association of America and others v Secretary of State for Energy and Climate Change*”, Case Comment, (2012) 13:2 Business L Intl 209 at 220 (HeinOnline); Patrick Secor, “European Union Law – EU Emissions Standards May Be Applied to Third-State Airlines Departing from Member States - Case C-366/10, *Air Transp. Ass’n of Am. v. Sec’y of State for Energy & Climate Change*, 49(3) C.M.L.R. 1113 (2011)”, Case Comment, (2012) 35:2 Suffolk Transnat’l L Rev 505 at 508–09 (HeinOnline); Scott & Rajamani, *supra* note 85 at 475; Hartmann, *supra* note 34 at 193; Ciolino, *supra* note 106 at 1153. See generally Verki Michael Tunteng et al, “Legal Analysis of the Inclusion of Civil Aviation in the European Union Emissions Trading System (EU ETS)” (2012) 24:3 Envtl L & Mgmt 119.

<sup>191</sup> See e.g. *Impact Assessment 2013*, *supra* note 59 at 9; Preston, Lee & Hooper, *supra* note 26 at 48; Secor, *supra* note 190 at 508–09; Lan, *supra* note 187 at 601; Armand de Mestral & Md Tanveer Ahmad, “EU Emissions Trading Scheme: Problems Presented to Canada”, Commentary, Carleton University Canada-Europe Transatlantic Dialogue (April 2012) at 1, online: Carleton University <[labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2012-07-eu-ets-scheme-ahmad-demestral.pdf](http://labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2012-07-eu-ets-scheme-ahmad-demestral.pdf)> [de Mestral & Ahmad, “EU Emissions”].

<sup>192</sup> Hartmann, *supra* note 34 at 187.

<sup>193</sup> The twenty-six States are: Argentina, Brazil, Canada, China, Chile, Colombia, Cuba, Egypt, Japan, Republic of Korea, Malaysia, Mexico, Nigeria, Paraguay, Peru, Philippines, Qatar, Russian Federation, Saudi Arabia, Singapore,

Africa, Canada, Japan, and the US, convened in New Delhi to discuss moves on how to oppose the EU ETS and, consequently, adopted an agreement, known as the *New Delhi Declaration*. Twenty-one States signed the agreement.<sup>194</sup> The Declaration stated that “the inclusion of non-EU states into the scheme was inconsistent with applicable international law and the states would present their opposition in a working paper to the ICAO Council for consideration.”<sup>195</sup>

- In November 2011, the ICAO Council joined these twenty-six States by adopting a declaration, presented as a working paper by these States,<sup>196</sup> which opposed the EU ETS.<sup>197</sup>
- The last collective response of States was the *Moscow Declaration* on February 22, 2012, where twenty-three States not only opposed the EU ETS, but also listed possible retaliatory actions unless the EU decided to cease implementation of the scheme to aircraft of non-EEA States.<sup>198</sup> This *Moscow Declaration* followed the decision of the CJEU that declared

---

South Africa, Thailand, Turkey, the United Arab Emirates, and the United States. See India, Ministry of Civil Aviation, Press Release, 76388, “International Meeting of ICAO Council and Non-EU Member States on Inclusion of Aviation in EU-ETS Held” (30 September 2011), online: Government of India Press Information Bureau <[pib.nic.in/newsite/erelease.aspx?relid=76388](http://pib.nic.in/newsite/erelease.aspx?relid=76388)> [India MCA, “International Meeting”].

<sup>194</sup> See Robert Wall & Madhu Unnikrishnan, “Update: 21 Nations Sign Declaration Opposing EU ETS”, *Aviation Week* (30 September 2011), online: Aviation Week Intelligence Network <[aviationweek.com/awin/update-21-nations-sign-declaration-opposing-eu-ets](http://aviationweek.com/awin/update-21-nations-sign-declaration-opposing-eu-ets)>.

<sup>195</sup> “BRICS, United States and others join in Delhi declaration to oppose EU’s imposition of ETS on their airlines”, *GREENAIRonline.com* (3 October 2011), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1344](http://www.greenaironline.com/news.php?viewStory=1344)>. See India MCA, “International Meeting”, *supra* note 193.

<sup>196</sup> Argentina et al, *Inclusion of International Civil Aviation in the European Union Emissions Trading Scheme (EU ETS) and its Impact*, ICAO Council, 194th Sess, Subject No 50, Working Paper Doc C-WP/13790 (2011). These twenty-six States are: Argentina, Brazil, Burkina Faso, Cameroon, China, Colombia, Cuba, Egypt, Guatemala, India, Japan, Malaysia, Mexico, Morocco, Nigeria, Paraguay, Peru, Republic of Korea, Russian Federation, Saudi Arabia, Singapore, South Africa, Swaziland, Uganda, the United Arab Emirates, and the United States.

<sup>197</sup> See Bill Carey, “ICAO Joins Airlines, Nations in Opposing Emissions Trading Scheme”, *AIN online* (7 November 2011), online: AIN online <[www.ainonline.com/aviation-news/air-transport/2011-11-07/icao-joins-airlines-nations-opposing-emissions-trading-scheme](http://www.ainonline.com/aviation-news/air-transport/2011-11-07/icao-joins-airlines-nations-opposing-emissions-trading-scheme)>.

<sup>198</sup> *Joint Declaration*, *supra* note 107. The twenty-three States are: Armenia, Argentina, Republic of Belarus, Brazil, Cameroon, Chile, China, Cuba, Guatemala, India, Japan, Republic of Korea, Mexico, Nigeria, Paraguay, Russian Federation, Saudi Arabia, Seychelles, Singapore, South Africa, Thailand, Uganda, and the United States. These States threatened to adopt the following nine retaliatory actions:

1. Filing an application to the ICAO Council under Article 84 of the *Chicago Convention* for the resolution of the dispute.
2. Using existing or new national measures to prohibit its own flag carriers from participating in the EU ETS.
3. Holding meetings with the EU carriers and/or aviation-related enterprises in their respective States and apprise them about the concerns arising out of the EU ETS and the possibility of reciprocal measures that could be adopted by the State, which may adversely affect those airlines and/or entities.
4. Mandating EU carriers to submit flight details and other data.
5. Determining the consistency of the EU ETS with the WTO Agreements and taking appropriate action.
6. Reviewing bilateral air services agreements with EU Member States and reconsidering the implementation or negotiation of the ‘Horizontal Agreement’ with the EU.

*Directive 2008/101* legal.<sup>199</sup> This move from non-EEA States thus demonstrated their rejection of that judicial decision.<sup>200</sup> Worth mentioning is the fact that the legality of *Directive 2008/101* was not challenged by any State but by three US airlines supported by one US airline trade association.<sup>201</sup>

The *Moscow Declaration* was not the end; States in their individual capacity commenced to initiate retaliatory actions:

- *China*: In February 2012, i.e. after the CJEU's decision, China banned its flag carriers from complying with the EU ETS.<sup>202</sup> In March 2012, China blocked a large number of aircraft orders from the European airframe manufacturer, Airbus.<sup>203</sup> By May 2012, it appeared that China's flag carriers refused to participate in the EU ETS.<sup>204</sup> Back in June 2011, China had threatened to take legal action against the EU for including aviation in the scheme.<sup>205</sup>
- *Russia*: In February 2012, the Russian Federation commenced steps to forbid its flag carriers from complying with the EU ETS and "threatened to deny Siberian overflight rights to European carriers".<sup>206</sup> Later in June 2012, Russia in fact withheld "free of charge"

- 
7. Suspending current and future discussions and/or negotiations to enhance operating rights for EU airlines/aircraft operators.
  8. Imposing additional levies/charges on EU carriers/aircraft operators as a form of countermeasure.
  9. Any other actions/measures.

See *ibid*, Attachment A.

<sup>199</sup> See *ATA v Secretary of State*, *supra* note 9.

<sup>200</sup> See e.g. Sanja Bogojević, "Legalising Environmental Leadership: A Comment on the CJEU'S Ruling in C-366/10 on the Inclusion of Aviation in the EU Emissions Trading Scheme" (2012) 24:2 J Envtl L 345 at 345–46; "US rejects European Court ruling on airline emissions", *BBC News* (21 December 2011), online: BBC News <[www.bbc.com/news/business-16282692](http://www.bbc.com/news/business-16282692)>. However, environmental groups applauded this decision. See Transport & Environment, Press Release, "Environmental Groups Hail Court Decision on Aviation Climate Law" (21 December 2011), online: Transport & Environment Pressroom <[www.transportenvironment.org/press/environmental-groups-hail-court-decision-aviation-climate-law](http://www.transportenvironment.org/press/environmental-groups-hail-court-decision-aviation-climate-law)>.

<sup>201</sup> See *ATA v Secretary of State*, *supra* note 9.

<sup>202</sup> See Chris Buckley, "China bans airlines from joining EU emissions scheme", *Reuters* (6 February 2012), online: Reuters <[www.reuters.com/article/2012/02/06/us-china-eu-emissions-idUSTRE81500V20120206](http://www.reuters.com/article/2012/02/06/us-china-eu-emissions-idUSTRE81500V20120206)>; Mavis Toh, "China bans airlines from complying with EU ETS", *Flight Global* (6 February 2012), online: Flight Global <[www.flightglobal.com/news/articles/china-bans-airlines-from-complying-with-eu-ets-367796/](http://www.flightglobal.com/news/articles/china-bans-airlines-from-complying-with-eu-ets-367796/)>.

<sup>203</sup> See Tim Hephher, "China halts 10 more Airbus orders: sources", *Reuters* (15 March 2012), online: Reuters <[www.reuters.com/article/2012/03/15/us-china-europe-ets-idUSBRE82E11620120315](http://www.reuters.com/article/2012/03/15/us-china-europe-ets-idUSBRE82E11620120315)>. See also de Leon, *supra* note 65 ("[r]eportedly, Lufthansa has not received permission to operate flights on A380 to Shanghai" at 293).

<sup>204</sup> See "Regulatory – Chinese Carriers Shun EU ETS Rules Warning; Signals Retaliation", *Air Transport World* (17 May 2012), online: Aviainform <[www.aviainform.org/industrynews/14-industrynews/2205-regulatory-chinese-carriers-shun-eu-ets-rules-warning-signals-retaliation.html](http://www.aviainform.org/industrynews/14-industrynews/2205-regulatory-chinese-carriers-shun-eu-ets-rules-warning-signals-retaliation.html)>.

<sup>205</sup> See "China threat over EU airline emissions trading", *BBC News* (6 June 2011), online: BBC News <[www.bbc.com/news/business-13668567](http://www.bbc.com/news/business-13668567)>.

<sup>206</sup> Tom Zaitsev, "Russia moves to ban carriers from complying with EU ETS", *Flight Global* (23 February 2012), online: Flight Global <[www.flightglobal.com/news/articles/russia-moves-to-ban-carriers-from-complying-with-eu-368690/](http://www.flightglobal.com/news/articles/russia-moves-to-ban-carriers-from-complying-with-eu-368690/)>. See also de Leon, *supra* note 65 (Russia threatened "EU carriers to raise transit charges through its

rights for EU airlines “to fly over Siberia in breach of its free-trade commitments in protest against” the EU ETS.<sup>207</sup>

- *India*: In March 2012, India also considered prohibiting its flag carriers from participating in the EU ETS,<sup>208</sup> and India’s Civil Aviation Minister stated that Indian flag carriers had not and would not comply with the requirement to submit emission details of their aircraft by March 31, 2012 under the scheme.<sup>209</sup> Previously in 2011, India suggested adopting a decision at the Durban Climate Change Conference held in November/December 2011 that would prohibit unilateral trade measures.<sup>210</sup> India refused “to ratify the horizontal agreement on certain aspects of air services with the EU and its Member States and to grant new transit rights to EU air carriers”.<sup>211</sup>
- *Canada*: Canada seriously considered “placing limitations on the polar flights performed by EU carriers”.<sup>212</sup>
- *Algeria*: Algeria brought action against *Directive 2008/101* “before the French courts, demanding compensation for the equipment necessary to comply with the EU ETS demands”.<sup>213</sup>
- *Australia*: In August 2012, the House of Representatives of Australia, the lower house of the Australian legislature, “passed a non-binding resolution calling on the Australian government to use all legal and diplomatic means to stop the application of ETS to international airlines”.<sup>214</sup>
- *Kingdom of Saudi Arabia*: On October 2012, Saudi Arabia ordered its national air carrier

---

Siberian airspace” at 293 [footnote omitted]); Reuters, “European Airlines Denied Overflight”, *The Moscow Times* (13 June 2012), online: The Moscow Times <[www.themoscowtimes.com/business/article/european-airlines-denied-overflight/460211.html](http://www.themoscowtimes.com/business/article/european-airlines-denied-overflight/460211.html)>.

<sup>207</sup> Christina Zander, “Russia Withholds EU Air Traffic Rights in Growing CO2 Trade Spat”, *4-traders* (7 June 2012), online: 4-traders <[www.4-traders.com/SAS-AB-9058794/news/Russia-Withholds-EU-Air-Traffic-Rights-in-Growing-CO2-Trade-Spat-14361417/](http://www.4-traders.com/SAS-AB-9058794/news/Russia-Withholds-EU-Air-Traffic-Rights-in-Growing-CO2-Trade-Spat-14361417/)>.

<sup>208</sup> See Mavis Toh, “India could ban airlines from complying with EU ETS”, *Flight Global* (20 March 2012), online: Flight Global <[www.flightglobal.com/news/articles/india-could-ban-airlines-from-complying-with-eu-ets-369673/](http://www.flightglobal.com/news/articles/india-could-ban-airlines-from-complying-with-eu-ets-369673/)>.

<sup>209</sup> See Mavis Toh, “Indian airlines will not submit emission details for EU ETS”, *Flight Global* (23 March 2012), online: Flight Global <[www.flightglobal.com/news/articles/indian-airlines-will-not-submit-emission-details-for-eu-369865/](http://www.flightglobal.com/news/articles/indian-airlines-will-not-submit-emission-details-for-eu-369865/)>.

<sup>210</sup> See Kulovesi, *supra* note 61 at 536.

<sup>211</sup> de Leon, *supra* note 65 at 293.

<sup>212</sup> Isavella Maria Vasilogiorgi, “27 Against The World: The EU ETS as Discord’s Apple Within ICAO” (2012) 65:2 RHDJ 531 at 546 (HeinOnline).

<sup>213</sup> *Ibid.*

<sup>214</sup> Madhu Unnikrishnan, “EU ETS Under Attack from Australian Lawmakers”, *AviationWeek* (21 August 2012), online: Aviation Week <[aviationweek.com/awin/eu-ets-under-attack-australian-lawmakers](http://aviationweek.com/awin/eu-ets-under-attack-australian-lawmakers)>.



not to comply with the EU ETS.<sup>215</sup>

- *The United States*: On November 27, 2012, President Obama signed a bill into law obliging the US Secretary of Transport to prohibit US flag carriers from participating in the EU ETS if “the Secretary determines the prohibition to be, and in a manner that is, in the public interest”.<sup>216</sup>

The 2013 Impact Assessment of the EU ETS on aviation, commissioned by the European Commission, disclosed that “Chinese mainland airlines and most Indian airlines have not complied with the EU ETS requirements” since 2011.<sup>217</sup> Even after the decision to defer the requirement of surrendering emission allowances under the EU ETS in April 2013, “China and India were the only two States from where no airline complied in 2012.”<sup>218</sup>

#### **5.4.5.2 Response from airlines and trade associations**

Airlines and trade associations demonstrated their protests against the EU ETS in various ways.<sup>219</sup> It is worth noting that they had initiated actions before the non-EEA States did so. As mentioned above, three US flag carriers, namely, American Airlines, Continental Airlines, and United Airlines, backed by the Air Transport Association of America (now Airlines for America (A4A)),<sup>220</sup> challenged the legality of *Directive 2008/101*. In December 2009, they filed a suit in the UK High Court of Justice, Queen’s Bench Division (Administrative Court).<sup>221</sup> This case was later referred to the CJEU for a preliminary ruling that ultimately declared the EU ETS valid.<sup>222</sup>

---

<sup>215</sup> See Wael Mahdi, “Saudi Arabia Said to Order Airline to Reject EU Carbon Rules”, *Bloomberg News* (2 October 2012), online: Bloomberg Business <[www.bloomberg.com/news/articles/2012-10-02/saudi-arabia-said-to-order-airline-to-reject-eu-emission-rules](http://www.bloomberg.com/news/articles/2012-10-02/saudi-arabia-said-to-order-airline-to-reject-eu-emission-rules)>.

<sup>216</sup> *European Union Emissions Trading Scheme Prohibition Act of 2011*, Pub L No 112–200, § 2, 126 Stat 1477 at 1477. See also Paul Lowe, “U.S. Officially Prohibits ETS Participation”, *Aviation International News* (3 January 2013), online: AIN Online <[www.ainonline.com/aviation-news/aviation-international-news/2013-01-03/us-officially-prohibits-ets-participation](http://www.ainonline.com/aviation-news/aviation-international-news/2013-01-03/us-officially-prohibits-ets-participation)>; Aaron Karp, “Obama signs bill enabling US airlines to skirt EU ETS”, *Air Transport World* (27 November 2012), online: Aviation Week <[atwonline.com/aeropolitics/obama-signs-bill-enabling-us-airlines-skirt-eu-ets](http://atwonline.com/aeropolitics/obama-signs-bill-enabling-us-airlines-skirt-eu-ets)>.

<sup>217</sup> *Impact Assessment 2013*, *supra* note 59 at 12.

<sup>218</sup> *Ibid* at 13.

<sup>219</sup> See e.g. Brian F Havel & John Q Mulligan, “The Triumph of Politics: Reflections on the Judgment of the Court of Justice of the European Union Validating the Inclusion of Non-EU Airlines in the Emissions Trading Scheme” (2012) 37:1 *Air & Space L 3* (Kluwer Law Online) (“[i]ndustry reaction [to the EU ETS] has been, if anything, even more condemnatory” at 7–8 [footnote omitted]).

<sup>220</sup> See Airlines for America, “History”, online: Airlines for America <[www.airlines.org/about-us/history/](http://www.airlines.org/about-us/history/)>.

<sup>221</sup> See “Three major US airlines and ATA file suit in London against UK Government over inclusion in EU ETS”, *GREENAIRonline.com* (18 December 2009), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=702](http://www.greenaironline.com/news.php?viewStory=702)>.

<sup>222</sup> See *ATA v Secretary of State*, *supra* note 9.

Two airline trade associations, namely the International Air Transport Association [IATA] and the National Airlines Council of Canada,<sup>223</sup> joined the applicants as interveners. In reality, IATA, which is a trade association of two hundred and fifty airlines that represent 83 percent of the total worldwide air traffic,<sup>224</sup> has been critical of the Union’s decision to include aviation in the EU ETS since its inception.<sup>225</sup> In October 2008, the IATA “blasted” the EU’s decision to include aviation in the scheme.<sup>226</sup> The trade association’s position with respect to the scheme has not altered since then, as apparent from the statements of Tony Tyler, Director General and CEO of IATA, rendered on various occasions.<sup>227</sup> Like IATA, other airline trade associations, e.g., the Association of Asia Pacific Airlines,<sup>228</sup> and the African Airlines Association,<sup>229</sup> continue to oppose the EU ETS.<sup>230</sup> Air

---

<sup>223</sup> The National Airlines Council of Canada is a trade association representing Canada’s largest passenger air carriers, including Air Canada, Air Transat, Jazz Aviation LP, and WestJet. See National Airlines Council of Canada, “Home”, online: National Airlines Council of Canada <[www.airlinecouncil.ca/](http://www.airlinecouncil.ca/)>.

<sup>224</sup> See International Air Transport Association, “Home”, online: IATA <[www.iata.org/Pages/default.aspx](http://www.iata.org/Pages/default.aspx)>.

<sup>225</sup> “The EU is facing criticism from many airline trade organizations regarding the new proposal. At the forefront of protestors is the International Air Transport Association (IATA)”. Janelle Veno, “Flying the Unfriendly Skies: The European Union’s New Proposal to Include Aviation in their Emissions Trading Scheme” (2007) 72:3 J Air L & Com 659 at 682 [footnote omitted] (HeinOnline).

<sup>226</sup> International Air Transport Association, Press Release, 50 (24 October 2008), online: IATA <[www.iata.org/pressroom/pr/Pages/2008-10-24-02.aspx](http://www.iata.org/pressroom/pr/Pages/2008-10-24-02.aspx)>.

<sup>227</sup> See “EU proposal to unilaterally regulate international flights in EU ETS puts global scheme at risk, says ‘shocked’ IATA”, *GREENAIRonline.com* (20 December 2013), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1803](http://www.greenaironline.com/news.php?viewStory=1803)>; Jens Flottau, “Critical Of EC, Tyler Warns Of ETS Distraction”, *Aviation Daily* (13 December 2013), online: Aviation Week <[aviationweek.com/awin/critical-ec-tyler-warns-ets-distraction](http://aviationweek.com/awin/critical-ec-tyler-warns-ets-distraction)>; Aaron Karp, “IATA DG Tyler: EU ETS ‘poisoning the atmosphere’ in global aviation”, *Air Transport World* (6 November 2012), online: ATW Plus <[atwonline.com/operations/iata-dg-tyler-eu-ets-poisoning-atmosphere-global-aviation](http://atwonline.com/operations/iata-dg-tyler-eu-ets-poisoning-atmosphere-global-aviation)>; Tierney Smith, “Opposition Mounts Over Aviation’s Inclusion in EU ETS”, *RTCC News* (2 October 2012), online: RTCC <[www.rtcc.org/2012/10/02/opposition-mounts-over-aviation%E2%80%99s-inclusion-in-eu-ets/](http://www.rtcc.org/2012/10/02/opposition-mounts-over-aviation%E2%80%99s-inclusion-in-eu-ets/)>; Gwyn Topham, “Airline Industry: EU Emissions Trading Scheme ‘could risk trade war’”, *The Guardian* (11 June 2012), online: The Guardian <[www.theguardian.com/world/2012/jun/11/airline-industry-eu-emissions-trading-trade-war](http://www.theguardian.com/world/2012/jun/11/airline-industry-eu-emissions-trading-trade-war)>.

<sup>228</sup> The Association of Asia Pacific Airlines is a not-for-profit association of Asia Pacific carriers. See Association of Asia Pacific Airlines, “Profile”, online: AAPA <[aapairlines.org/Profile.aspx](http://aapairlines.org/Profile.aspx)>.

<sup>229</sup> The African Airlines Association is a trade organization of airlines of African States. There are currently forty members of the Association. See African Airlines Association, “Background”, online: AFRAA <[www.afraa.org/index.php/about-us/background](http://www.afraa.org/index.php/about-us/background)>.

<sup>230</sup> See Association of Asia Pacific Airlines, Press Release, Issue 2013:16, “AAPA Comments on Proposed Revisions to EU ETS” (17 October 2013), online: AAPA Media Centre <[www.aapairlines.org/resource\\_centre/AAPA\\_PR\\_Issue16\\_EU\\_ETS\\_17Oct13.pdf](http://www.aapairlines.org/resource_centre/AAPA_PR_Issue16_EU_ETS_17Oct13.pdf)>; Association of Asia Pacific Airlines, Press Release, Issue 2012:21, “AAPA Welcomes Suspension of EU ETS: Focus rightly shifts to ICAO” (13 November 2012), online: AAPA Media Centre <[www.aapairlines.org/resource\\_centre/AAPA\\_PR\\_Issue21\\_Environment\\_EU\\_ETS\\_Suspension\\_13Nov12.pdf](http://www.aapairlines.org/resource_centre/AAPA_PR_Issue21_Environment_EU_ETS_Suspension_13Nov12.pdf)>; Association of Asia Pacific Airlines, Press Release, Issue 2011:22, “AAPA Calls for Renewed Political Dialogue on EU ETS: CJEU decision fails to calm international political furore” (23 December 2011), online: AAPA Media Centre <[www.aapairlines.org/resource\\_centre/AAPA\\_PR\\_Issue22\\_AviationEnvironmentEUETSandCJEU\\_23Dec11.pdf](http://www.aapairlines.org/resource_centre/AAPA_PR_Issue22_AviationEnvironmentEUETSandCJEU_23Dec11.pdf)>; Fredrick Obura, “African airlines oppose EU emissions trading scheme”, *Standard Digital* (16 January 2012), online: Standard Digital <[www.standardmedia.co.ke/?id=2000050064&cid=14&articleID=2000050064](http://www.standardmedia.co.ke/?id=2000050064&cid=14&articleID=2000050064)>.

Algérie “brought proceedings before the *Conseil d'état* (State Council) in France”, contesting the legality of the French national legislation that transposes *Directive 2008/101*.<sup>231</sup>

#### **5.4.5.3 Response from within the EU**

The EU encountered resistance from inside as well:

- In April 2011, Lufthansa, the flag carrier of Germany, stated that “too many problems remain unresolved” concerning the implementation of *Directive 2008/101*, and warned that such an initiative would “become a “fiasco” when it [went] into effect” in January 2012.<sup>232</sup> Earlier, Lufthansa “threatened to relocate to Zurich, Switzerland – a [non-EEA State] – to sidestep the [EU] ETS” after the European Commission had proposed for a Directive to include aviation in the scheme.<sup>233</sup>
- In February 2012, European airlines increased pressure on the Union to suspend the ETS for aviation “following concern that EU carriers will be the “major losers” in the event of a trade war.”<sup>234</sup>
- In March 2012, Airbus blamed the EU ETS row for the cancellation of Chinese orders.<sup>235</sup>
- On November 15, 2013, both left- and right-wing Members of the European Parliament [MEPs] slammed the European Commission’s proposal to amend the EU ETS that would hold airlines accountable for their emissions occurring within the EEA airspace.<sup>236</sup> Commenting on the proposal, Jacqueline Foster, a Conservative MEP, stated “We look ridiculous”.<sup>237</sup> Additionally, she said that “[t]he scheme was never going to save CO<sub>2</sub> [emissions]”; “[t]he majority in ICAO voted against, and you didn’t like what the majority said. You don’t like mutual consent”.<sup>238</sup>

---

<sup>231</sup> de Leon, *supra* note 65 at 293 [emphasis in original].

<sup>232</sup> Aaron Karp, “Lufthansa: Airlines’ inclusion in EU ETS in danger of becoming ‘fiasco’”, *Air Transport World* (11 April 2011), online: Air Transport World <atwonline.com/operations/lufthansa-airlines-inclusion-eu-ets-danger-becoming-fiasco>.

<sup>233</sup> Reagan, *supra* note 10 at 369.

<sup>234</sup> Kirsty McGregor, “European airlines step up opposition to EU ETS”, *Flight Global* (9 February 2012), online: Flight Global <www.flightglobal.com/news/articles/european-airlines-step-up-opposition-to-eu-ets-368019/>.

<sup>235</sup> See Will Nichols, “Airbus blames EU carbon trading row for falling Chinese orders”, *The Guardian* (9 March 2012), online: The Guardian Environment Network <www.theguardian.com/environment/2012/mar/09/airbus-eu-carbon-trading-chinese>.

<sup>236</sup> See Tanja Milevska, “EU aviation emissions proposals attacked from all sides”, *EurActiv.com* (15 November 2013), online: EurActiv.com <www.euractiv.com/transport/commission-fails-comprehensive-p-news-531697>.

<sup>237</sup> *Ibid.*

<sup>238</sup> *Ibid.*

#### **5.4.5.4 Update on response: is a trade war ahead?**

No new objections to the EU ETS have been heard from non-EEA States since the last amendment to the scheme, which restricted its scope to the EEA airspace. The situation is becoming calmer than before, as is apparent from the deal reached between China and Airbus on March 26, 2014, which granted Airbus the right to assemble A320 aircraft in China until 2025, and “unblocked orders for larger jets worth more than \$6 billion”.<sup>239</sup> The EU’s 2013 Impact Assessment of the ETS on aviation accepted that the “stop-the-clock” option adopted by the Union in April 2013, which restricted the scope of application of the EU ETS to emissions from “intra-EEA flights and flights to and from closely connected areas but not flights to other non-EEA” States, already proved “in practice to be accepted by large majority of international partners”.<sup>240</sup> For example, all the members of the Airlines for America [A4A], which unsuccessfully challenged the legality of *Directive 2008/101* along with American Airlines, Continental Airlines, and United Airlines, are complying with the amended EU ETS, since, according to Nancy Young, A4A’s Vice President, Environment, they did not challenge the intra-EEA application of the scheme.<sup>241</sup>

Nevertheless, it can be predicted that a trade war will erupt between the EEA Member States and non-EEA States by reason of the application of the EU ETS to aircraft of the latter States. In April 2014, Germany ordered 61 airlines, including flag carriers of Russia, China, and the US, to pay fines for the violation of the EU ETS.<sup>242</sup> The Netherlands followed in the steps of Germany by initiating the process of charging a Chinese airline for “failing to submit an annual emissions report for 2012.”<sup>243</sup> A regional Belgian government fined the Saudi Arabian Airlines,

---

<sup>239</sup> Cyril Altmeyer, “China extends Airbus production venture, unblocks A330 deal”, *Reuters* (26 March 2014), online: Reuters <[www.reuters.com/article/2014/03/26/us-france-china-airbus-idUSBREA2P1HZ20140326](http://www.reuters.com/article/2014/03/26/us-france-china-airbus-idUSBREA2P1HZ20140326)>.

<sup>240</sup> *Impact Assessment 2013*, *supra* note 59 at 23, 47 (the “stop-the-clock” option, which shows the lowest coverage of only 25 percent, “has been accepted in 2012 by most international partners, as a step forward from any of those countries compared to their earlier positions” at 48).

<sup>241</sup> See “Aircraft operator hit with half a million euro EU ETS non-compliance penalty as EU states send out enforcement notices”, *GREENAIRonline.com* (24 February 2014), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1827](http://www.greenaironline.com/news.php?viewStory=1827)>.

<sup>242</sup> See Ewa Krukowska & Birgit Jennen, “Germany Levies Fines on Aircraft Operators Over Emissions”, *Bloomberg* (30 April 2014), online: Bloomberg Business <[www.bloomberg.com/news/2014-04-30/germany-levies-fines-on-aircraft-operators-over-emissions.html](http://www.bloomberg.com/news/2014-04-30/germany-levies-fines-on-aircraft-operators-over-emissions.html)>; “EU States tread warily on naming and shaming Aircraft Operators that have failed to comply with EU ETS Rules”, *GREENAIRonline.com* (15 December 2014), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2021](http://www.greenaironline.com/news.php?viewStory=2021)> [“EU States tread warily”].

<sup>243</sup> See “Netherlands and Germany fine foreign airlines over ETS”, *Transport & Environment* (30 May 2014), online: Transport & Environment <[www.transportenvironment.org/news/netherlands-and-germany-fine-foreign-airlines-over-ets](http://www.transportenvironment.org/news/netherlands-and-germany-fine-foreign-airlines-over-ets)>.

the flag carrier of the Kingdom of Saudi Arabia.<sup>244</sup> This was the first major carrier that faced such fines for non-compliance.<sup>245</sup>

Few EEA Members States have commenced to publish non-compliance list of airlines. At the time of writing, Italy, Germany, and the UK have published a non-compliance list of airlines administered by these three States for the purposes of the EU ETS.<sup>246</sup> However, none of these lists, except the UK's one, includes any major carriers from non-EEA States. These lists include few small operators from the Russian Federation and the US.<sup>247</sup> Though Aeroflot and Air China, Russian and Chinese flag carriers, respectively, were ordered to pay fines by German authority in 2014, they do not appear in the list probably because they have challenged the penalty notices.<sup>248</sup> Chinese and most US flag carriers now comply with the EU ETS.<sup>249</sup> Aeroflot initially sent a “protest” letter to the European Parliament,<sup>250</sup> and then appealed against the €215,000 fine by the German authorities.<sup>251</sup> As mentioned before, Russia had commenced steps to forbid its flag carriers from complying with the EU ETS. No non-compliance list of airlines was published by the respective Dutch and Belgian authorities. In the case of the Netherlands, it is not clear whether that fine was recovered and whether the non-compliant aircraft operator agreed to comply with the EU

---

<sup>244</sup> See “Saudi Arabian Airlines fined \$1.6 million for breaking EU aviation law”, *Reuters* (18 May 2015), online: Reuters <[www.reuters.com/article/2015/05/18/eu-saudi-aviation-idUSL5N0Y63P120150518](http://www.reuters.com/article/2015/05/18/eu-saudi-aviation-idUSL5N0Y63P120150518)>.

<sup>245</sup> See *ibid.*

<sup>246</sup> To view the Italian list, see Italy, Ministero dell’Ambiente e della tutela del territorio e del mare, *Il Comitato nazionale per la gestione della Direttiva 2003/87/CE e per il supporto nella gestione delle attività di progetto del Protocollo di Kyoto*, online: Ministero dell’Ambiente e della tutela del territorio e del mare <[www.minambiente.it/sites/default/files/archivio/allegati/emission\\_trading/comunicato\\_operatori\\_aerei\\_sanzione\\_rev2.pdf](http://www.minambiente.it/sites/default/files/archivio/allegati/emission_trading/comunicato_operatori_aerei_sanzione_rev2.pdf)>. To view the German list, see Deutsche Emissionshandelsstelle (DEHSt), “Informationen zur Sanktionierung”, online: DEHSt <[www.dehst.de/SharedDocs/Boxen/DE/Sanktionsverfahren.html](http://www.dehst.de/SharedDocs/Boxen/DE/Sanktionsverfahren.html)>. To view the UK list, see UK Environment Agency, *Transparency data: EU ETS civil penalties: aviation* (12 June 2015), online: GOV.UK <[www.gov.uk/government/publications/climate-change-regimes-civil-penalties-imposed/eu-ets-civil-penalties-aviation](http://www.gov.uk/government/publications/climate-change-regimes-civil-penalties-imposed/eu-ets-civil-penalties-aviation)> [UK Environment Agency, *Transparency data: aviation*].

<sup>247</sup> See *ibid.*

<sup>248</sup> See “Germany fines Aircraft Operators \$5.9 million as it publishes first Aviation EU ETS non-compliance list”, *GREENAIRonline.com* (5 March 2015), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2054](http://www.greenaironline.com/news.php?viewStory=2054)>.

<sup>249</sup> See “Chinese and Indian airlines come into compliance with EU ETS as Swiss case moves to EU's highest court”, *GREENAIRonline.com* (19 May 2015), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2084](http://www.greenaironline.com/news.php?viewStory=2084)>.

<sup>250</sup> “Russia’s Aeroflot to Appeal Environmental Fine for Flights Over Europe”, *Sputnik News* (25 July 2014), online: Sputnik International <[www.sputniknews.com/business/20140725/191246005/Russias-Aeroflot-to-Appeal-Environmental-Fine-for-Flights-Over.html](http://www.sputniknews.com/business/20140725/191246005/Russias-Aeroflot-to-Appeal-Environmental-Fine-for-Flights-Over.html)> [“Russia’s Aeroflot”].

<sup>251</sup> Alex Derber, “Saudia pays first big emissions fine”, *MRO Network* (21 May 2015), online: MRO Network <[www.mro-network.com/opinion/2015/05/saudia-pays-first-big-emissions-fine/5413](http://www.mro-network.com/opinion/2015/05/saudia-pays-first-big-emissions-fine/5413)>.

ETS.<sup>252</sup> It is not even clear whether or not that airline in question is a Chinese flag carrier.<sup>253</sup> In the case of Belgium, the fine has been recovered from the Saudi Arabian Airlines, which implies the non-EEA aircraft operator's compliance with the EU ETS.<sup>254</sup>

The only major aircraft operator, which appears on the UK's list, is Air India.<sup>255</sup> Earlier in 2014, the UK, which administers Indian flag carriers, announced to publish a non-compliance list by June 30, 2015,<sup>256</sup> in response to which, India's representative to the ICAO Council asserted that Indian airlines "would not be complying with the scheme, even under the reduced intra-EEA scope."<sup>257</sup> Although the other Indian flag carrier, namely Jet Airways, now complies with the EU ETS after losing an appeal against a fine, whether or not Air India will comply cannot be guaranteed. As noted above, India prohibited its flag carriers from complying with the EU ETS. One Indian government official was reported to have said that it was unlikely that Air India "would pay the penalty and the issue would have to be dealt with at a diplomatic level."<sup>258</sup>

If flag carriers from the Russian Federation and India ultimately refuse to pay the fines, the only option left to assure compliance with the EU ETS would be to impose an operating ban on those respective airlines. Resort to this last option will trigger retaliatory action from Russia and India that would have dire consequences. Meltzer contends that "[s]uch tit-for-tat trade retaliation could lead to increased trade protectionism, an outcome that would reduce global economic growth and welfare."<sup>259</sup> Ultimately, the environmental objective of the EU ETS to curb emissions from aviation will remain elusive. It was predicted before the implementation of *Directive 2008/101* that this unilateral action would damage "the friendly development of [the] international aviation

---

<sup>252</sup> See Andrew Murphy, "Airlines violating ETS law should be named", *EurActiv.com* (21 May 2015), online: [www.euractiv.com <www.euractiv.com/sections/transport/airlines-violating-ets-law-should-be-named-314763>](http://www.euractiv.com/sections/transport/airlines-violating-ets-law-should-be-named-314763).

<sup>253</sup> See *ibid.*

<sup>254</sup> See Aviation Environment Federation and Transport & Environment, Press Release, "Non-EU airlines in spotlight after Saudi carrier breaches emissions rules" (19 May 2015), online: [Aviation Environment Federation <www.aef.org.uk/2015/05/19/non-eu-airlines-in-spotlight-after-saudi-carrier-breaches-emissions-rules/>](http://www.aef.org.uk/2015/05/19/non-eu-airlines-in-spotlight-after-saudi-carrier-breaches-emissions-rules/); Derber, *supra* note 251; Murphy, *supra* note 252.

<sup>255</sup> See UK Environment Agency, *Transparency data: aviation*, *supra* note 246; "Air India hit with UK fine for failing to comply with Aviation EU ETS", *GREENAIRonline.com* (5 March 2015), online: [GREENAIR <www.greenaironline.com/news.php?viewStory=2106>](http://www.greenaironline.com/news.php?viewStory=2106) ["Air India hit with UK fine"].

<sup>256</sup> See UK, Department of Energy & Climate Change, *Implementing the Aviation EU Emissions Trading System Regulation (421/2014) in UK Regulations* (Consultation Response Document, URN 14D/423) (London, UK: Department of Energy & Climate Change, 2014) at 8, online: [GOV.UK <www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/377689/Government\\_response\\_to\\_consultation\\_on\\_Greenhouse\\_Gas\\_Emissions\\_Trading\\_Scheme\\_Regulations\\_\\_Amendments\\_\\_2014.pdf>](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/377689/Government_response_to_consultation_on_Greenhouse_Gas_Emissions_Trading_Scheme_Regulations__Amendments__2014.pdf).

<sup>257</sup> "EU States tread warily", *supra* note 242.

<sup>258</sup> "Air India hit with UK fine", *supra* note 255.

<sup>259</sup> Meltzer, *supra* note 61 at 123. See also Kulovesi, *supra* note 61 ("[a] tit-for-tat dynamic is hardly conducive to confidence-building and laying a solid foundation for a global, comprehensive, and effective climate treaty" at 558).

industry”,<sup>260</sup> “damage...confidence-building efforts in [climate change] negotiations, or even lead to unhealthy competition between various jurisdictions for legal influence and retaliation.”<sup>261</sup> Some of these predictions have already come true.

The EU is well-aware of this risk and, hence, its Member States have been hesitant to take action against non-compliant aircraft operators of non-EEA States.<sup>262</sup> Although Germany finally published its list of non-compliant airlines in early 2015, it originally announced to publish that list in July 2014.<sup>263</sup> In the case of the UK, the Environment Agency was expected to publish the list of non-compliant aircraft operators by the end of June 2014 for the 2012 period.<sup>264</sup> However, the authority “declined to do so on the grounds that all appeals procedures had not been exhausted.”<sup>265</sup>

It can be observed that, after the last amendment to the EU ETS, which confined its scope to the EEA airspace, a significant number of non-EEA airlines have commenced to comply with the scheme. Originally, under *Directive 2008/101*, the scheme had extraterritorial reach that, as mentioned before, was the main reason why States objected to the inclusion of aviation in the EU ETS. Nonetheless, it is probable that, according to *Regulation 421/2014* that amended the scheme, the original scope of the EU ETS will be reinstated if ICAO Contracting States fail to reach a meaningful agreement with respect to global market-based measures for international civil aviation in the next session of the ICAO Assembly in 2016.<sup>266</sup> If the EU chooses to return to *Directive 2008/101* after 2016, it is highly likely that a trade war will erupt. Therefore, the present situation, i.e. compliance with the amended EU ETS by a significant number of non-EEA aircraft operators, cannot be viewed as an end to the trade war. The risk of trade war remains.

States adopted the *Chicago Convention* with the intention “to create and preserve friendship and understanding among the nations of the world” through the development of international civil aviation, and “to avoid friction and to promote that cooperation between nations and peoples”.<sup>267</sup> However, rather than creating and preserving friendship and understanding between the EEA Member States and non-EEA States, the EU ETS is causing friction between

---

<sup>260</sup> Lan, *supra* note 187 at 600.

<sup>261</sup> Kulovesi, *supra* note 61 at 557 [footnote omitted]. See also Reagan, *supra* note 10.

<sup>262</sup> See “EU States tread warily”, *supra* note 242.

<sup>263</sup> See *ibid.*

<sup>264</sup> See *ibid.*

<sup>265</sup> *Ibid.*

<sup>266</sup> See *Regulation 421/2014*, *supra* note 32 at 4.

<sup>267</sup> *Chicago Convention*, *supra* note 66, Preamble.

these groups, undoubtedly against the intention of the Parties as expressed in the Preamble of the Convention. As Professor Milde puts it, by adopting this unilateral measure, the EU has shown disrespect “towards the visionary aims of the Convention and towards...ICAO and its Member States”.<sup>268</sup>

#### **5.4.6 Impacts of the resistance from non-EEA States**

Massive opposition to the EU ETS and retaliatory actions from non-EEA economically powerful States with established airline industries would largely limit the effectiveness of the scheme in the realm of aviation. Such actions imply that these non-EEA States do not consider the inclusion of aviation in the EU ETS as legitimate. According to Shaffer and Bodansky, the effectiveness of unilateral measures will often be determined by “perceptions of legitimacy”: “Where a rule or norm advanced unilaterally is deemed to be illegitimate, it will spur greater resistance...undermining its effectiveness.”<sup>269</sup> They contend that the EU’s unilateral action on the climate change issue is legitimate on the basis that the US never ratified the *Kyoto Protocol* whereas the Union advanced its implementation.<sup>270</sup> Nevertheless, the enormous resistance that *Directive 2008/101* has encountered leads one to conclude that such unilateral action is “deemed to be illegitimate” and, hence, will be less effective. Following this pressure from both inside and out, the EU first deferred the requirement of surrendering emission allowances under the ETS and, thereafter, amended it by significantly limiting its territorial scope for the 2013 – 2016 period.<sup>271</sup>

It should be stressed that the dispute that arose between the EU and non-EEA States by reason of including aviation in the EU ETS is “the first real clash concerning unilateral measures to combat climate change.”<sup>272</sup> Moreover, as Professor Pablo Mendes de Leon puts it, “[t]he number and intensity of the reactions are unprecedented in the history of international civil aviation.”<sup>273</sup> In the field of the environment, EU environmental protection is regarded as “both a value and

---

<sup>268</sup> Milde, “The EU Emissions”, *supra* note 58 at 178.

<sup>269</sup> Shaffer & Bodansky, *supra* note 123 at 41.

<sup>270</sup> See *ibid* at 39. Although it was the US who was concerned with the inclusion of emissions trading in the *Kyoto Protocol*, it did not ratify the Protocol even after its inclusion. On the other hand, while the EU did not support the concept of emissions trading at the beginning, it ratified the Protocol. To learn more about the negotiating history of the Protocol, see generally Sebastian Oberthür & Hermann E Ott, *The Kyoto Protocol: International Climate Policy for the 21st Century* (New York: Springer-Verlag, 1999).

<sup>271</sup> From 2013 to 2016, only emissions from flights within the EEA would fall under the EU ETS. See *Regulation 421/2014*, *supra* note 32.

<sup>272</sup> Hartmann, *supra* note 34 at 187.

<sup>273</sup> de Leon, *supra* note 65 at 294.



normative aspiration.”<sup>274</sup> The EU is considered as having “the potential to serve as a “norm entrepreneur” and transfer its environmental values to its trade partners”.<sup>275</sup> Failure of the Union to achieve the necessary objective, namely, substantial abatement of emissions from international civil aviation that contribute to climate change and global warming by adopting market-based measures, will definitely harm its role as a norm entrepreneur.<sup>276</sup> In the arena of global climate politics, the EU has already lost much influence after it unsuccessfully endeavored to upload its preferred environmental norms.<sup>277</sup> Ultimately, as Shaffer and Bodansky argue, the impact of a unilateral measure “depends on whether it is persuasive in shaping norms of behaviour.”<sup>278</sup> Before adopting any unilateral measure, States need to know whether the right time has arrived to resort to such measures that will encourage other States to take action.<sup>279</sup> They must strike a balance between two possibilities that the adoption of such measures may cause: the possibility of creating environmental norms, and the possibility of causing friction and frustrating efforts to reach a multilateral solution at the global level.<sup>280</sup> In the case of international civil aviation, it appears from the above discussion that the perfect time has yet to arrive that would permit the EU to adopt such unilateral environmental measures.<sup>281</sup>

#### **5.4.7 The influence of the EU’s unilateral actions in shaping global environmental norms**

In the area of environmental protection, although the EU has the potential to act as a norm entrepreneur and export its environmental values to non-EEA States, it has yet to succeed in this respect.<sup>282</sup> For example, though the Union “played a leading role in driving negotiations

---

<sup>274</sup> Elaine Fahey & Ester Herlin-Karnell, “EU Law qua Global Governance Law? Deciphering Regulatory and Constitutional Competence Between EU Environmental Law and Global Governance” (2012) 13:11 German LJ 1147 at 1147 [footnote omitted] (HeinOnline).

<sup>275</sup> Ciolino, *supra* note 106 at 1185–86. See also Ester Herlin-Karnell, “The EU as a Promoter of Values and the European Global Project” (2012) 13:11 German LJ 1225 at 1242ff (HeinOnline).

<sup>276</sup> See Hartmann, *supra* note 34 at 187; Van Schaik & Schunz, *supra* note 1 at 183.

<sup>277</sup> See e.g. Van Schaik & Schunz, *supra* note 1 at 182.

<sup>278</sup> Shaffer & Bodansky, *supra* note 123 at 41.

<sup>279</sup> See Kulovesi, *supra* note 61 (“[t]he dilemma related to unilateral measures is therefore to know how much multilateralism must be attempted before resorting to unilateralism, in other words, when will unilateralism be useful in terms of encouraging other countries to take action and when will it only make things worse” at 559).

<sup>280</sup> See also Ciolino, *supra* note 106 at 1185.

<sup>281</sup> See also Stephanie Koh, “The Case Against Extending the EU Emissions Trading Scheme to International Aviation” (2012) 30 Sing L Rev 125 (HeinOnline) (Koh argues that extending the EU ETS to international civil aviation “will only serve to weaken diplomatic relations with the EU and delay the achievement of a global solution to aviation emissions” at 129).

<sup>282</sup> See Van Schaik & Schunz, *supra* note 1 at 183 (“‘Europe’s attainment is normative rather than empirical’ in the domain of climate change: the EU’s predominantly norm-driven approach yielded little practical impact” at 183);

forward”<sup>283</sup> with respect to the *Kyoto Protocol*’s second commitment period, and the *Copenhagen Accord*,<sup>284</sup> it could not successfully “convince the other parties to the negotiations to adopt its positions on how to address global climate change.”<sup>285</sup> Until now, the success of the EU is limited to “getting international actors to the negotiating table”,<sup>286</sup> which is also the case in international civil aviation.<sup>287</sup> At the negotiating table, the EU “has largely failed to influence the global climate regime through exporting its policy solutions to the global level”.<sup>288</sup> Furthermore, the Union has failed to convince the non-EEA States “to buy into its position on global environmental governance.”<sup>289</sup>

In the area of aviation emissions, unlike the hushkit dispute discussed above,<sup>290</sup> the EU has been successful in getting ICAO Contracting States to the negotiating table to more effectively negotiate the matter. Additionally, the EU has been successful in ensuring that ICAO accelerates its activities in this respect. This led to the agreement to develop a global market-based measure that, if agreed to at the next session of the ICAO Assembly scheduled to be held in 2016, will be effective from 2020.<sup>291</sup>

The increased speed of ICAO processes can be observed if one looks at the number of meaningful activities the Organization undertook after the EU had adopted *Directive 2008/101* on

---

Ciolino, *supra* note 106 at 1185–86; Fahey & Herlin-Karnell, *supra* note 274 (“[t]he promotion of EU external values is subject to variable – even weak – enforcement, and a lack of global consensus” at 1148 [footnote omitted]).<sup>283</sup> Ciolino, *supra* note 106 at 1186. See also Charles F Parker & Christer Karlsson, “Climate Change and the European Union’s Leadership Moment: An Inconvenient Truth?” (2010) 48:4 J Common Market Studies 923 (Wiley) (“[t]he EU has attempted to be the global standard bearer on climate change by laying out bold unilateral goals, vigorously supporting the Kyoto Protocol and pushing hard for an ambitious post-2012 successor agreement” at 924).

<sup>284</sup> *Copenhagen Accord*, 18 December 2009, in UNFCCC, *Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009. Addendum. Part Two: Action taken by the Conference of the Parties at its fifteenth session*, UNFCCC Conference of the Parties, 15th Sess, Doc FCCC/CP/2009/11/Add.1 (2010), 4, online: UNFCCC

[unfccc.int/documentation/documents/advanced\\_search/items/6911.php?preref=600005735](http://unfccc.int/documentation/documents/advanced_search/items/6911.php?preref=600005735).

<sup>285</sup> Ciolino, *supra* note 106 at 1186 [footnote omitted]. For a detailed discussion, see Van Schaik & Schunz, *supra* note 1 at 178–82. One of the reasons for this failure may be that the EU Member States have yet to meet their obligations under the *Kyoto Protocol* thereby undermining the credibility and effectiveness of EU’s climate leadership. See Parker & Karlsson, *supra* note 283.

<sup>286</sup> Ciolino, *supra* note 106 at 1186.

<sup>287</sup> See also Preston, Lee & Hooper, *supra* note 26 at 54–55.

<sup>288</sup> Van Schaik & Schunz, *supra* note 1 at 169.

<sup>289</sup> Ciolino, *supra* note 106 at 1186.

<sup>290</sup> See section 5.4.4, *above*. See also Andrea Gattini, “Between Splendid Isolation and Tentative Imperialism: The EU’s Extension of its Emission Trading Scheme to International Aviation and the ECJ’s Judgment in the ATA Case” (2012) 61:4 ICLQ 977 at 990.

<sup>291</sup> Gattini, *supra* note 290 at 990 [footnote omitted], states that, “[o]f course, one could think that the EU Commission had strategically decided to push through Directive 2008/10 as a bargaining tool in the ICAO negotiations towards a global market-based mechanism for aviation emissions reduction”.

January 13, 2009. In October 2009, the High-level Meeting on International Aviation and Climate Change was held by ICAO.<sup>292</sup> Since the 37<sup>th</sup> Session of the ICAO Assembly held in 2010, the Assembly has been adopting two, instead of one,<sup>293</sup> resolutions dealing with aviation environmental issues where one resolution is devoted to, and earmarked, climate change.<sup>294</sup> The issue of climate change has been segregated from other environmental issues to demonstrate ICAO's increased seriousness on the former issue. On July 10, 2012, a CO<sub>2</sub> metric system, which characterizes the CO<sub>2</sub> emissions for aircraft types with varying technologies, was unanimously agreed on by ICAO's CAEP.<sup>295</sup> In early 2012, six potential options for a global market-based measure scheme were identified and those options were reduced to three by the ICAO Council in June 2012.<sup>296</sup> During the 2012 – 2013 period, ICAO performed a significant number of important studies concerning market-based measures that had not been previously undertaken.<sup>297</sup> In November 2012, a High-level Group, comprising officials from seventeen States, was set up “to provide near-term recommendations on a series of policy issues” that arose in the course of performing those important studies.<sup>298</sup> At the ICAO Assembly's 37<sup>th</sup> Session, an agreement to

---

<sup>292</sup> To view the documents of this meeting, see ICAO, “Archived Meetings: High Level 2009”, online: ICAO <[www.icao.int/Meetings/AMC/MA/Forms/AllItems.aspx?RootFolder=%2fMeetings%2fAMC%2fMA%2fHigh%20Level%202009&FolderCTID=0x0120008FBF5BD6E74225408C846CE885FC7730](http://www.icao.int/Meetings/AMC/MA/Forms/AllItems.aspx?RootFolder=%2fMeetings%2fAMC%2fMA%2fHigh%20Level%202009&FolderCTID=0x0120008FBF5BD6E74225408C846CE885FC7730)>.

<sup>293</sup> Prior to the 37<sup>th</sup> Session, the practice was to adopt one resolution to address aviation environmental issues. Resolutions A36-22 and A35-5 are examples of such resolutions. See *ICAO Res A36-22*, *supra* note 27; *Consolidated statement of continuing ICAO policies and practices related to environmental protection*, ICAO Assembly Res A35-5, 35th Sess, ICAO Doc 9848, I-37, online: ICAO <[www.icao.int/publications/Documents/9848\\_en.pdf](http://www.icao.int/publications/Documents/9848_en.pdf)>.

<sup>294</sup> See *ICAO Res A37-19*, *supra* note 29; *ICAO Res A38-18*, *supra* note 24.

<sup>295</sup> See ICAO, News Release, COM 15/12, “New Progress on Aircraft CO<sub>2</sub> Standard” (11 July 2012), online: ICAO <[www.icao.int/Newsroom/Pages/new-progress-on-aircraft-CO2-standard.aspx](http://www.icao.int/Newsroom/Pages/new-progress-on-aircraft-CO2-standard.aspx)>. See also ch 3, *above*; Jane Hupe, “Aviation and Environment: Developments Since the Last Assembly” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished]; ICAO, News Release, COM 4/13, “ICAO Environmental Protection Committee Delivers Progress on New Aircraft CO<sub>2</sub> and Noise Standards” (14 February 2013), online: ICAO <[www.icao.int/Newsroom/Pages/ICAO-environmental-protection-committee-delivers-progress-on-new-aircraft-CO2-and-noise-standards.aspx](http://www.icao.int/Newsroom/Pages/ICAO-environmental-protection-committee-delivers-progress-on-new-aircraft-CO2-and-noise-standards.aspx)>.

<sup>296</sup> See *Report on Market-based Measures*, *supra* note 38 at (vii).

<sup>297</sup> Examples of these studies include: *Report on Market-based Measures*, *supra* note 38; ICAO, “Report on Geographic Scope of Market-based Measures (MBMS): Analysis of proposed approaches for the coverage of international aviation emissions under a market-based measure” (July 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/REPORT%20ON%20GEOGRAPHIC%20SCOPE%20OF%20MBMs.pdf](http://www.icao.int/Meetings/a38/Documents/REPORT%20ON%20GEOGRAPHIC%20SCOPE%20OF%20MBMs.pdf)> [ICAO, “Report on Geographic Scope”]; ICAO, “Offsets for International Aviation Emissions” (August 2012), online: ICAO <[www.icao.int/Meetings/a38/Documents/Offsets%20for%20International%20Aviation%20Emissions.v10.14%20August.pdf](http://www.icao.int/Meetings/a38/Documents/Offsets%20for%20International%20Aviation%20Emissions.v10.14%20August.pdf)>; ICAO, “Eligibility of civil aviation projects under the Clean Development Mechanism (CDM)” (June 2012), online: ICAO <[www.icao.int/Meetings/a38/Documents/CDM\\_Report.pdf](http://www.icao.int/Meetings/a38/Documents/CDM_Report.pdf)>.

<sup>298</sup> ICAO, News Release, COM 20/12, “New ICAO Council High-level Group to Focus on Environmental Policy Challenges” (15 November 2012), online: ICAO <[www.icao.int/Newsroom/Pages/new-ICAO-council-high-level-group-to-focus-on-environmental-policy-challenges.aspx](http://www.icao.int/Newsroom/Pages/new-ICAO-council-high-level-group-to-focus-on-environmental-policy-challenges.aspx)>. See also “ICAO appoints 17 countries to new High-level

*develop a framework* for market-based measures in international civil aviation was also reached,<sup>299</sup> and, at the 38<sup>th</sup> Session in 2013, an agreement to *develop* a market-based measure for international civil aviation was reached. It is doubtful whether such progress at ICAO would have happened without the EU's unilateral action. The EU has taken the first step that is necessary to reduce growing emissions from aviation.<sup>300</sup> Worth noting is the fact that one of the three measures under consideration by ICAO is emissions trading. This implies that the EU gained a first-mover advantage through the inclusion of aviation in the ETS. This unilateral move enabled the Union to use the EU ETS to define the problem of emissions from aviation and to propose global emissions trading scheme as one of the solutions to that problem.

It should be noted that the EU has played a leading role in the area of maritime pollution as well. In international maritime law, the strong bargaining position of the EU at the IMO led to the amendment of the *MARPOL Convention*,<sup>301</sup> concerning prevention of pollution from ships, by adding Chapter 4 to Annex VI,<sup>302</sup> which, as mentioned above, imposes technical and operational energy efficiency measures for all ships of 400 gross tonnage and above.<sup>303</sup> However, unlike aviation, the EU has not included shipping in the ETS. This is surprising due to the following facts mentioned earlier: the global shipping industry emits more greenhouse gases than international civil aviation does; the MEPC of the IMO recognized that the current technical and operational measures are insufficient to satisfactorily reduce such emissions from shipping; the MEPC, therefore, agreed that a market-based measure was required as part of a package of measures to effectively regulate such emissions; the IMO has to date only considered such measures in contrast to ICAO where an agreement to develop such measure has been reached; and the MEPC, however, agreed to postpone discussions on market-based measures for a future session.<sup>304</sup> The IMO MEPC's agreement in 2013 to postpone discussions on market-based measures can be equated with ICAO CAEP's agreement in 2004 not to further pursue an aviation-specific emissions trading

---

Group to hammer out important policy issues on aviation MBMs", *GREENAIRonline.com* (28 November 2012), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1626](http://www.greenaironline.com/news.php?viewStory=1626)>.

<sup>299</sup> See *ICAO Res A37-19*, *supra* note 29 at I-71.

<sup>300</sup> See Kulovesi, *supra* note 61 at 537.

<sup>301</sup> *MARPOL*, *supra* note 41. This agreement was amended before entry into force by *Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973*, 17 February 1978, 1340 UNTS 61 (entered into force 2 October 1983). These multilateral instruments were both adopted after the US threatened "to impose unilaterally double-hull standards on oil tankers entering its ports". Bodansky, *supra* note 108 at 344.

<sup>302</sup> See *MARPOL*, *supra* note 41, Annex VI, ch 4.

<sup>303</sup> See Gattini, *supra* note 290 at 990.

<sup>304</sup> See section 5.2, *above*.

system. Although that agreement of ICAO's CAEP served as one of the motivating factors for including aviation in the EU ETS, no significant motivation can be observed on the part of the EU to include shipping in the scheme after the IMO MEPC's postponement agreement. It is argued that the European Commission has yet to include the shipping industry in the EU ETS being deterred by massive protests from non-EEA States against its endeavor "to cover [emissions from] international flights".<sup>305</sup> It can be inferred that this opposition from non-EEA States has negatively affected the EU's prospective role as a norm entrepreneur and its ability to influence negotiation in the maritime industry.

In the case of aviation, although the EU has been successful in getting ICAO Contracting States to the negotiating table and in ensuring that the Organization accelerates its activities in the area of aviation emissions, it can be observed from the last session of the ICAO Assembly that the Union has failed to convince non-EEA ICAO Contracting States to allow any State to develop and implement new and existing market-based measures, respectively, without mutual agreement.<sup>306</sup> As mentioned before, according to Assembly Resolution A38-18, States need to engage in consultations and negotiations with other States to reach an agreement when designing new and implementing existing market-based measures for international civil aviation.<sup>307</sup> It has been pointed out that ideological differences between the EEA Member States and non-EEA States are responsible for this: whereas environmental protection has become one of the top most concerns for the EU,<sup>308</sup> non-EEA States are more concerned with their national economic interests rather

---

<sup>305</sup> Dirk Böhler, "The EU Emissions Trading Scheme - Fixing A Broken Promise" (2013) 15 *Env'tl L Rev* 95 at 101 (HeinOnline).

<sup>306</sup> Although implementing the EU ETS on the basis of mutual agreement would ensure more effectiveness of the measure, this can have several disadvantages. Abeyratne, *supra* note 144 at 368, writes:

The drawbacks of this approach are that if a State wanted to include all airlines operating on a given route, the mutual agreement approach would have the disadvantage of requiring that State to negotiate agreements with all States whose carriers operate on that route. This could be time-consuming and may increase the risk of a fragmented approach. The potential for State(s) to not accede to the inclusion of its carriers could result in the nonequal application of the Scheme and competitive distortion between carriers on the same route. There could also be additional complications such as avoidance behaviour if airlines change leasing or code-share arrangements.

<sup>307</sup> See *ICAO Res A38-18*, *supra* note 24 at I-72.

<sup>308</sup> Van Schaik & Schunz, *supra* note 1 at 178, argue:

EU climate change policymaking was above all shaped by its norms. The predominant logic of social action underpinning EU external activity on climate change is thus not one of consequence as its expected (political, economic, security) gains from early climate action are at best mixed. Despite uncertainty about gains and cost, the Union has embarked on the endeavour to lead the world on climate change in line with its normative foundations. The EU's international climate policy is primarily guided by what it considers appropriate action.

than the protection of the environment.<sup>309</sup> Due to these differences, the negotiation process cannot succeed in reaching a viable solution; uncertainty and distrust pervade the process leading the “parties to become suspicious of their opponents potential ulterior motives.”<sup>310</sup> This suspicion renders States less compromising to reach a solution, which often leads to a stalemate.<sup>311</sup> The last session of the ICAO Assembly revealed, as noted earlier, that differences between developed and developing States on certain issues are delaying the formation and implementation of a global market-based measure for international civil aviation. Although such differences have not led to a stalemate, they are nonetheless delaying the process.

#### **5.4.8 Unilateral market-based measures vs multilateral market-based measures**

Market-based measures are cost-effective environmental measures that can help to reduce emissions from aviation.<sup>312</sup> As economic measures, market-based measures can put pressure on industry to adopt various initiatives, mainly technical measures, to decrease its environmental footprint.<sup>313</sup> A well-designed market-based measure for international civil aviation can “use emissions banking, trading, offsetting to spur innovation”,<sup>314</sup> “reward those who achieve real emission reductions”, “save money...by promoting competition to achieve reductions better, cheaper, faster”, and “provide certainty that environmental targets will be met”.<sup>315</sup> It is now well

---

<sup>309</sup> Ciolino, *supra* note 106 at 1186 [footnotes omitted], explains why there is a gap between EU’s environmental goals and its ability to export these norms in the following terms:

There are several explanations for the gap between the EU’s environmental goals and its ability to transfer these norms to other international actors. The first is a result of a conflict of values between the EU and other key actors in climate negotiations. The EU is a “norm-driven actor,” and shapes its climate policy around its concerns for protecting its “environmental, economic, and security-related” interests in the long-term, even if it is necessary to incur costs in the short-term. In contrast, countries such as the United States, Japan, and four of the larger developing economies, Brazil, South Africa, India and China (BASIC), are “interest-driven actors,” focused on protecting their short-term economic interests.

See also Van Schaik & Schunz, *supra* note 1.

<sup>310</sup> Ciolino, *supra* note 106 at 1186 [footnote omitted].

<sup>311</sup> See *ibid* at 1186–87.

<sup>312</sup> The suitability of market-based measures for international civil aviation has long been recognized. See *Impact Assessment 2013*, *supra* note 59 at 9.

<sup>313</sup> See ch 4, *above*.

<sup>314</sup> Petsonk, *supra* note 19. See also Antigoni Lykotrafiti, “EU Innovation Policy: Lessons Learned from the Inclusion of Aviation in the EU Emissions Trading Scheme” (2013) 40:4 LIEI 339 (Kluwer Law Online) (the initiative of the EU to include aviation in the EU ETS “has functioned as a catalyst for innovation in the [aviation] sector” at 339).

<sup>315</sup> Petsonk, *supra* note 19. See also ICAO Secretariat, *supra* note 19 at 138. But see Andrew Howard, “Status and Structure of the Carbon Market” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 132 (“many governments in the developing world are questioning whether market approaches are able to deliver on the needs they have for sustainable development” at 135).

understood that, without effective global market-based measures, ICAO's goal of achieving carbon neutral growth from 2020 will remain a dream.<sup>316</sup> The forecasts by ICAO's CAEP show that, even after the implementation of technology and operational improvements and assuming three percent use of alternative fuels, "the emissions gap from carbon neutral growth in 2020 would be on the order of 500 Mt by 2040".<sup>317</sup> Hence, ICAO argues that market-based measures are essential "to fill this emissions gap, together with sustainable alternative fuels".<sup>318</sup> ICAO's assessment reports on three market-based measures under consideration by the Organization, namely global mandatory offsetting, global mandatory offsetting with revenue, and global emissions trading, concluded that all of those measures are cost-effective, are technically feasible, will have marginal impact on future growth, and have the capacity to contribute to achieving ICAO's environmental goals.<sup>319</sup>

However, for a market-based measure to be effective, extensive geographic coverage and participation from all States in such measures are essential.<sup>320</sup> Such coverage and participation cannot be obtained by any unilateral market-based measure like the EU ETS: such measures cannot be implemented beyond the national border(s) of the State(s) adopting the measure without consent from foreign State(s), and not all airlines of all States fly to a specific State or region. The 2013 Impact Assessment of the Union's ETS on aviation also acknowledged the limited scope of the scheme in addressing emissions from aviation. The application of full-scope EU ETS, i.e. including emissions from aircraft over the high seas and the territory of non-EEA States, would cover "35% of global emissions (i.e. emissions from domestic and international flights) and about 50% of emissions from international aviation."<sup>321</sup> The 2013 Impact Assessment concluded that,

---

<sup>316</sup> See ch 4, *above*. However, Russia does not believe the same. See Russian Federation, *Market-Based Measures as the Factor of an Increase of Greenhouse Gas Emissions in the Sector of International Civil Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 250, Doc A38-WP/250/Ex/83 (20 August 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp250\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp250_en.pdf)>.

<sup>317</sup> ICAO, *Environment: Market-based*, *supra* note 19.

<sup>318</sup> *Ibid.*

<sup>319</sup> See *Report on Market-based Measures*, *supra* note 38.

<sup>320</sup> See ICAO, "Report on Geographic Scope", *supra* note 297 at 9.

<sup>321</sup> *Impact Assessment 2013*, *supra* note 59 at 9. An earlier impact study, conducted by Annela Anger of the Cambridge Centre for Climate Change Mitigation Research, that applied the Energy– Environment–Economy Model for Europe suggested that "total CO<sub>2</sub> emissions in 2020 from the air transport sector will diminish in response to increasing costs by a measure of 0.3%, 3.4% and 7.4% in response to an allowance price of €5, €20 and €40". Annela Anger, "Including Aviation in the European Emissions Trading Scheme: Impacts on the Industry, CO<sub>2</sub> Emissions and Macroeconomic Activity in the EU" (2010) 16:2 *J Air Transport Management* 100 at 103. A later study performed by Anger and Köhler found that "CO<sub>2</sub> emissions are expected to decline by a maximum of 3.8%" due to the inclusion of aviation in the EU ETS. See Annela Anger & Jonathan Köhler, "Including Aviation

without further market-based measures, “not even the target of stabilisation at 2020 levels would be reached because 50% of the emission growth would not be addressed”.<sup>322</sup>

The EU eventually had to back off from its original legislation, namely *Directive 2008/101*, which covered emissions over the high seas as well as over the territory of non-EEA States, and restrict the coverage to intra-EEA flights only. Hence, the amended EU ETS will cover 12.5 percent of emissions from international civil aviation.<sup>323</sup> The EU ETS does not apply to overflights and, due to the latest amendment, to flights that either arrive at or depart from an aerodrome situated in the territory of an EEA Member State. Unless airlines from non-EEA States exercise their fifth freedom rights,<sup>324</sup> this scheme would not have any impact on them. Such limited applicability of the EU ETS will fail to render significant change in terms of reduction of emissions from international civil aviation. The application of the EU ETS to all emissions from aircraft occurring within the EEA airspace would render the scheme more effective; it will cover more than fifty percent of emissions from international civil aviation. Any endeavor by airlines to evade the EEA airspace, e.g., by detouring, or by shifting their hubs from European cities to cities of non-EEA States close to the EU, so that they can avoid application of the EU ETS, will only increase their costs.<sup>325</sup> In the case of detouring, the costs will increase since aircraft will need to fly more distances that will, in effect, require more fuel. Unless the EU ETS costs more than the fuel costs,<sup>326</sup> airlines would not resort to such flight plan.<sup>327</sup>

Commercial airlines are in a profit-making business and will employ every method

---

Emissions in the EU ETS: Much Ado About Nothing? A Review” (2010) 17:1 Transport Policy 38 at 38. To learn about more impact studies published between 2005 and 2009, see Anger & Köhler, *ibid*.

<sup>322</sup> *Impact Assessment 2013*, *supra* note 59 at 9.

<sup>323</sup> The 2013 Impact Assessment of the EU ETS on aviation reported that the application of the scheme to flights between aerodromes situated in the territory of the EEA Member States will cover only 25 percent of emissions compared to the application of the scheme to aviation in its original form under *Directive 2008/101*. See *ibid* at 23, 46, 48.

<sup>324</sup> Fifth freedom right authorizes an airline to carry passengers, mail, and cargo between two States outside its own State of registry so long as the flight originates or terminates in its own State of registry. See *International Air Transport Agreement*, 7 December 1944, 171 UNTS 387, art 1(1); Dempsey, *supra* note 15 at 24. Unless the concerned States are Parties to the *International Air Transport Agreement*, *ibid*, such right has to be negotiated and, consequently, granted through bilateral air services agreement between States.

<sup>325</sup> See also Meltzer, *supra* note 61 at 120–21; Jan Vespermann & Andreas Wald, “Much Ado about Nothing? – An Analysis of Economic Impacts and Ecologic Effects of the EU-Emission Trading Scheme in the Aviation Industry” (2011) 45:10 Transportation Research Part A: Policy and Practice 1066 at 1074.

<sup>326</sup> “[C]ost containment is among the most important objectives for airlines in the 21st century.” Paul Stephen Dempsey & Laurence E Gesell, *Airline Management Strategies for the 21st Century*, 2nd ed (Chandler, Ariz: Coast Aire Publications, 2006) at 493. For more discussion on airline’s costs, see *ibid*, ch 11.

<sup>327</sup> See Meltzer, *supra* note 61 at 121–22; Havel & Mulligan, *supra* note 219 (“such avoidance manoeuvres are not likely to prove commercially sensible” at 19).



possible to ensure lesser emissions in intra-EEA flights without declining profit. Airlines do not make money when their aircraft are on the ground; they make money when their birds fly. Moreover, replacing older aircraft with newer ones involves huge investment.<sup>328</sup> Therefore, the European routes, where the EU ETS applies, will be served by most fuel-efficient, younger aircraft and other routes by less fuel-efficient, older aircraft.<sup>329</sup> Such a possibility was also foreseen by the EU in its 2006 Impact Assessment of the ETS on aviation.<sup>330</sup> Unfortunately, the consequences of such practices were not considered in that Assessment.<sup>331</sup> These would include carbon-leakage since use of less fuel-efficient, older aircraft will keep emissions at their present level.<sup>332</sup> Since emissions occurring anywhere on Earth can accelerate climate change and global warming, the potential for national or regional efforts like the EU ETS to significantly reduce emissions is doubtful.

In contrast to unilateral measures, a multilaterally agreed-to market-based measure can extend beyond the border of any State and can even cover aircraft emissions over the high seas over which no State has jurisdiction.<sup>333</sup> Participation in such a measure will be greater than any unilateral measure since multilateral measures are adopted with necessary consent from States.<sup>334</sup>

---

<sup>328</sup> For the new Airbus aircraft list prices for 2014, see Airbus, Press Release, “New Airbus aircraft list prices for 2015” (13 January 2015), online: Airbus Press Centre <[www.airbus.com/presscentre/%20pressreleases/press-release-detail/detail/new-airbus-aircraft-list-prices-for-2015/](http://www.airbus.com/presscentre/%20pressreleases/press-release-detail/detail/new-airbus-aircraft-list-prices-for-2015/)>. For the prices of Boeing commercial aircraft, see Boeing, “About Boeing Commercial Airplanes: Prices”, online: Boeing <[www.boeing.com/company/about-bca/index.page%23/prices#/prices](http://www.boeing.com/company/about-bca/index.page%23/prices#/prices)>.

<sup>329</sup> See e.g. Meltzer, *supra* note 61 at 120; Gudo Borger, “All things not being equal: Aviation in the EU ETS” (2012) 3:3-4 *Climate L* 265 at 280 (IOS Press); Vespermann & Wald, *supra* note 325 at 1074.

<sup>330</sup> See EC, *Commission Staff Working Document: Accompanying document to the Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community: Impact Assessment of the inclusion of aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, SEC(2006) 1684 (Brussels: EC, 2006) at 52, online: European Commission <[ec.europa.eu/clima/policies/transport/aviation/docs/sec\\_2006\\_1684\\_en.pdf](http://ec.europa.eu/clima/policies/transport/aviation/docs/sec_2006_1684_en.pdf)>.

<sup>331</sup> In fact, the 2006 Impact Assessment was criticized by aviation representatives: “EU aviation interests...argued that the study did not adequately account for the economic effects of extending the ETS to aviation. Non-EU interests...argued that the study gave insufficient consideration to the impacts of extending the ETS to international aviation felt outside of the EU.” Reagan, *supra* note 10 at 381 [footnotes omitted].

<sup>332</sup> See Meltzer, *supra* note 61 at 120; Veno, *supra* note 225 at 686.

<sup>333</sup> See e.g. Theodore Konstadinides, “When in Europe: Customary International Law and EU Competence in the Sphere of External Action” (2012) 13:11 *German LJ* 1177 at 1192-93 (HeinOnline) (“it is a long-established principle of customary international law that no state may unilaterally subject any part of the high seas to its sovereignty since the open sea is not part of its territory” at 1192).

<sup>334</sup> See Abeyratne, *supra* note 144 (“[a]n inherent advantage of mutual agreement is that it provides for certainty in relation to the participation of the covered foreign aircraft operators and facilitates the enforcement of obligations under the Scheme” at 368). Reagan, *supra* note 10 at 381 [footnote omitted], argues that, “as nearly all countries with international aviation operators are members of the ICAO, developing emissions reduction measures through the ICAO would increase participation from all primary international aviation stakeholders.”

If every State develops its own model of market-based measures, it will not bring any benefit to the environment. Implementation of such measures to foreign companies before obtaining necessary consent from the respective foreign State can be risky, which can be observed from the above discussion. Such national or regional measures may or may not have any connection with the protection of the environment.<sup>335</sup> “as the impact of climate change becomes more severe, climate change may serve as a pretext for all kinds of protectionist policies.”<sup>336</sup> More unilateral measures will give rise to more fragmented approaches worldwide, creating chaos.<sup>337</sup> Hardeman argues that a global framework for aviation is required chiefly to “avoid a patchwork of conflicting and potentially overlapping national and regional policies”.<sup>338</sup> Such unilateral measures will encounter more challenges creating “a period of uncertainty and increased tensions due to these competing regulatory measures”.<sup>339</sup> This will not only halt “any forward action in efforts to address climate change, but also [undermine] the effectiveness of these [unilateral] measures as tools to address environmental problems.”<sup>340</sup> Coordination among States is warranted to effectively check emissions from aviation that contribute to climate change and global warming.

As economic measures, market-based measures concern money. Hence, any unilateral market-based measure like the EU ETS will encounter opposition from other States in the absence of clear guidelines concerning the use of revenues generated through such measures. No State likes to contribute to the national treasury of another State without consent. Concurrently, no State is authorized to dictate how another State may use its funds even if the former has any contribution.

---

<sup>335</sup> See Shaffer & Bodansky, *supra* note 123 (“[u]nilateral action can often be tailored to benefit national economic interests over foreign ones, bestowing a competitive advantage on particular states and their constituencies, especially powerful ones” at 40); de Chazournes, *supra* note 108 (“[a] point to be borne in mind is that environmental protection is seldom the only motive for [unilateral] measures: political, strategic, social and especially, economic considerations may also be present” at 319).

<sup>336</sup> Hartmann, *supra* note 34 at 187. See also de Chazournes, *supra* note 108 at 321; Meltzer, *supra* note 61 at 117.

<sup>337</sup> See generally Tate L Hemingson, “Why Airlines Should Be Afraid: The Potential Impact of Cap and Trade and Other Carbon Emissions Reduction Proposals on the Airline Industry” (2010) 75:3 J Air L & Com 741 (HeinOnline) (“without a global approach to emissions regulation, airlines could ‘be subject to a patchwork of varying, unilateral programs throughout the world.’” at 772 [footnote omitted]). Ciolino, *supra* note 106 at 1182 [footnotes omitted], argues:

A second concern with the authorization of the Directive, as a unilateral environmental measure, is its potential to lead to fragmentation of measures to address aviation emissions. This fragmentation, with different programs adopted by individual countries, will create a “political maelstrom,” and instigate repeat challenges within the WTO on whether the imposition of these measures on members, without their consent, is based on protectionist motives.

See also Koh, *supra* note 281 at 139.

<sup>338</sup> Hardeman, *supra* note 19 at 27.

<sup>339</sup> Ciolino, *supra* note 106 at 1182.

<sup>340</sup> *Ibid* [footnote omitted].

The principle of sovereignty permits every State to freely take decisions on its internal or external affairs, which include the choice of an economic system.<sup>341</sup> The principle of non-intervention prohibits “all States or groups of States to intervene directly or indirectly in internal or external affairs of other States.”<sup>342</sup> In contrast to unilateral measures, the question of transparency would not arise in a multilaterally agreed-to measure with clear guidelines, due to the requirement of consent of other States. With States’ consent, a separate international body or a new branch/section within the established bodies, e.g., ICAO, can be set up to deal with the revenues generated from such multilateral measure. Although guidelines regarding the use of auction proceeds are provided, EU Member States are accorded discretion regarding the use of such revenues generated from auction under the EU ETS.<sup>343</sup> Certainly, this failed to please the non-EEA States and was one of the reasons that ignited the abovementioned responses and retaliatory actions.<sup>344</sup>

To achieve their environmental goals, market-based measures need to cover a variety of gases that contribute to the environmental problem the measure attempts to redress. With necessary consent from States to cover a number of gases, the scope of multilateral market-based measures can be greater than unilateral ones. In the absence of such consent, it is highly likely that any endeavor to include various gases in any unilateral market-based measure will meet with widespread resistance from foreign States. In aviation, apart from CO<sub>2</sub>, aircraft emissions of relevance to climate change and global warming include water vapor (H<sub>2</sub>O), nitric oxide (NO), nitrogen dioxide (NO<sub>2</sub>),<sup>345</sup> sulfur oxides (SO<sub>x</sub>O), and soot.<sup>346</sup> Compared to CO<sub>2</sub>, the other gases and particles emitted by aircraft have shorter atmospheric residence times and remain concentrated

---

<sup>341</sup> See *Nicaragua Case*, *supra* note 63 at 108.

<sup>342</sup> *Ibid.*

<sup>343</sup> See ch 3, *above*; Md Tanveer Ahmad, “EU Emissions Trading Scheme: Problems Presented to Canada”, *European Union Centres of Excellence Newsletter* 7:1 (Winter 2012) 1 at 1, online: Carleton University <carleton.ca/euce-network-canada/wp-content/uploads/V7-1-EUCE-Newsletter-Winter2012.pdf>; *Directive 2008/101*, *supra* note 8 at 6, 9.

<sup>344</sup> See e.g. Obura, *supra* note 230. In July 2014, while speaking about Aeroflot’s plan to lodge an appeal against the fine charged by the EU against that Russian flag carrier, Vitaly Savelyev, Director General of Aeroflot, stated “Who will tell us where these funds will go?” “Russia’s Aeroflot”, *supra* note 250.

<sup>345</sup> Nitric oxide and nitrogen dioxide are jointly termed nitrogen oxides (NO<sub>x</sub>).

<sup>346</sup> See ch 2, *above*; World Bank, *Air Transport and Energy Efficiency*, Transport Papers, TP – 38 (February 2012) at 31, online: World Bank <siteresources.worldbank.org/INTAIRTRANSPORT/Resources/TP38.pdf>; IPCC, “Summary for Policymakers: Aviation and the Global Atmosphere” in Joyce E Penner et al, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999) 1 at 3 [IPCC, “Summary: Aviation”]. See also ICAO, “Contaminants”, online: ICAO <www.icao.int/environmental-protection/Pages/Contaminants.aspx>.

near flight routes.<sup>347</sup> Nonetheless, these emissions can lead to radiative forcing that is regionally located near the flight routes for some components, e.g., ozone (O<sub>3</sub>), and contrails,<sup>348</sup> contrary to emissions that are globally mixed, e.g., CO<sub>2</sub> and methane (CH<sub>4</sub>).<sup>349</sup> Aircraft emitted nitrogen oxides (NO<sub>x</sub>), i.e. NO and NO<sub>2</sub> jointly, participate in ozone chemistry and accelerate climate change and global warming.<sup>350</sup> Aircraft emitted water vapor, sulfur oxides (that form sulfate particles), and soot play both direct and indirect roles in ozone chemistry.<sup>351</sup> However, compared to CO<sub>2</sub>, science has not developed enough to determine with sufficient certainty the actual effects of non-CO<sub>2</sub> gases on climate change and global warming.<sup>352</sup> These non-CO<sub>2</sub> gases must nevertheless be taken into account, since emissions of non-CO<sub>2</sub> gases will increase over time, if left unregulated, and, as mentioned above, non-CO<sub>2</sub> emissions can lead to radiative forcing.<sup>353</sup> Non-governmental organizations have criticized the EU ETS for leaving aviation's non-CO<sub>2</sub> impacts unaddressed.<sup>354</sup>

Nonetheless, where the higher scientific understanding of the effects of CO<sub>2</sub> failed to lead to any global market-based measure addressing CO<sub>2</sub>, it would be very difficult to include non-CO<sub>2</sub> gases emitted by aircraft in the EU ETS,<sup>355</sup> which has already encountered substantial opposition from non-EEA States. In fact, as noted before,<sup>356</sup> the EU planned to address emissions of NO<sub>x</sub> through legislation to be proposed by the European Commission in 2008.<sup>357</sup> However, no such legislation has ever been proposed. Regulating non-CO<sub>2</sub> emissions from aviation would be easier through a multilateral mechanism, due to the requirement of consensus, than it would be through a unilateral one. It is suggested that a multilateral measure should address non-CO<sub>2</sub> impacts of aviation in the near future, in order to effectively restrain emissions from international civil aviation.<sup>358</sup>

---

<sup>347</sup> See IPCC, "Summary: Aviation", *supra* note 346 at 3.

<sup>348</sup> See World Bank, *supra* note 346 at 31–32.

<sup>349</sup> See IPCC, "Summary: Aviation", *supra* note 346 at 3.

<sup>350</sup> See *ibid* at 3, 6.

<sup>351</sup> See *ibid* at 4.

<sup>352</sup> See *ibid* at 6; Preston, Lee & Hooper, *supra* note 26 at 52–53. See also Barton, "Tackling", *supra* note 104 at 320–21.

<sup>353</sup> See Preston, Lee & Hooper, *supra* note 26 at 53.

<sup>354</sup> See *ibid* at 48. In fact, the European Parliament and a significant number of NGOs have urged the European Commission to propose the inclusion of nitrous oxide. See Staniland, *supra* note 25 at 159.

<sup>355</sup> See also Preston, Lee & Hooper, *supra* note 26 at 53.

<sup>356</sup> See section 5.4.3, *above*.

<sup>357</sup> See *Directive 2008/101*, *supra* note 8 at 5–6.

<sup>358</sup> Preston, Lee & Hooper, *supra* note 26 at 53, state:

The effectiveness of any legal mechanism hinges on the compliance and enforcement of that mechanism and, to ensure compliance and enforcement, provisions on non-compliance and their effective implementation are necessary. The EU ETS contains the following relevant provisions: failure to surrender enough allowances to cover all its emissions at the end of each year will lead to a fine of €100 per ton of carbon emitted over the limit set by *Directive 2003/87*, and continued failure may lead to an operating ban on the delinquent airline.<sup>359</sup> However, as discussed earlier, it is highly likely that exercise of these rights under *Directive 2008/101* will bring about a trade war that is detrimental to the environment.<sup>360</sup> Again, one can question the legitimacy of the operating ban since such ban cannot be justified under the *Chicago Convention* or, in the absence of necessary environmental provisions to this effect, under the bilateral or multilateral agreements that the EU and the EEA States have with non-EEA States.<sup>361</sup> Under the *Chicago Convention*, failure to meet minimum ICAO standards is the only ground that can justify imposing an operating ban on the airlines of foreign States.<sup>362</sup> However, no ICAO standard that resembles the EU ETS has yet to be set. The establishment of a multilateral market-based measure for international civil aviation would set standards that could justify imposing an operating ban. A multilateral mechanism should contain non-compliance provisions. Compared to unilateral mechanisms, such provisions will be easier to enforce in such a case due to the necessary consent of States, the lesser presence of resistance to the mechanism, and thereby the absence of the risk of legitimate retaliatory action from another State.

It appears that ICAO prefers multilateralism to unilateralism since, among others, Assembly resolutions dealing with climate change always suggest this preference of the Organization, and the ICAO Council did not hesitate to join the twenty-six non-EEA States against the EU ETS by adopting a declaration in November 2011 that opposed the scheme. Like ICAO,

---

If we consider that the level of scientific understanding regarding CO<sub>2</sub> is high, and yet international policy commitment to its mitigation took many years to negotiate then it is fair to assume that policy to address the non-CO<sub>2</sub> impacts will take some time. This creates a dilemma as to whether to focus policy efforts on CO<sub>2</sub> alone or whether this focus should be split between the CO<sub>2</sub> and the non-CO<sub>2</sub> impacts of aviation, at the risk of making political consensus all the more difficult. This challenging issue has yet to be resolved, yet for the industry to be seriously considered as moving towards a sustainable future, it is imperative that these non-CO<sub>2</sub> impacts are addressed.

See also Barton, “Tackling”, *supra* note 104 at 320–21.

<sup>359</sup> See ch 3, *above*.

<sup>360</sup> See section 5.4.5.4, *above*.

<sup>361</sup> For a good discussion on the issue of operating ban under the EU ETS, see de Leon, *supra* note 65 at 297–301.

<sup>362</sup> See *Chicago Convention*, *supra* note 66, art 33.

most international organizations support and promote multilateralism. The United Nations [UN] also supports multilateralism in addressing environmental issues.<sup>363</sup> Principle 12 of the *Rio Declaration* provides, *inter alia*, that:

Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on an international consensus.<sup>364</sup>

The same language can be found in *Agenda 21*,<sup>365</sup> which was produced simultaneously to the *Rio Declaration* by the 1992 Rio Conference on Environment and Development.<sup>366</sup> Although *Agenda 21* is not legally binding, “it is potentially relevant to interpretation of treaties and other instruments adopted in accordance with its provisions.”<sup>367</sup> The *UNFCCC* has not borrowed the same language from the *Rio Declaration*. Nonetheless, one of the principles of the *UNFCCC* is:

The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.<sup>368</sup>

Likewise, the WTO also prefers multilateral environmental agreements to unilateral action.<sup>369</sup> For example, in the *Shrimp-Turtle* decision, the WTO Appellate Body stated, “Clearly,

---

<sup>363</sup> See also Matthew D Kasper, “The Air Transport Association’s Challenge to the European Union’s Extension of Its Emissions Trading Scheme to International Aviation: A Legal Analysis” (2010) 10:1 *Issues in Aviation L & Policy* 145 at 167 (HeinOnline); Ciolino, *supra* note 106 at 1181, n 190.

<sup>364</sup> *Rio Declaration*, *supra* note 98, Principle 12.

<sup>365</sup> “Agenda 21” in *Report of the United Nations Conference on Environment and Development*, vol 1, Resolutions adopted by the Conference, Annex II, UN Doc A/CONF.151/26/Rev.1 (1993) 12 at para1.1, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=52](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=52)>. *Agenda 21* “is a programme of action covering many issues, including climate change...” Birnie, Boyle & Redgwell, *supra* note 98 at 52.

<sup>366</sup> Nonetheless, Sands et al, *supra* note 98 at 195 [footnotes omitted] [emphasis in original], argue that “[t]he Rio Declaration and Agenda 21 did not, however, prohibit *per se* all unilateral environmental measures, an approach which was subsequently endorsed by the WTO Appellate Body (subject to certain conditions being satisfied) and in the WSSD Plan of Implementation.” Likewise, Fox, *supra* note 149 at 2519–20, argues: “Notably, however, the language of these documents suggests that unilateral action might be necessary in certain circumstances. By limiting the reach of the principle to those instances when international consensus is “possible,” the statement suggests that unilateral measures may be acceptable when circumstances prevent countries from developing a mutually acceptable approach to a global environmental problem.” See also Sands, “Unilateralism”, *supra* note 108 at 295–96.

<sup>367</sup> Birnie, Boyle & Redgwell, *supra* note 98 at 52.

<sup>368</sup> *UNFCCC*, *supra* note 148, art 3(5).

<sup>369</sup> See Ciolino, *supra* note 106 at 1181, n 190. However, I am not suggesting that the WTO prohibits unilateral actions for the protection of the environment. In fact, as Shaffer & Bodansky, *supra* note 123 at 40 [footnote omitted], assert, “WTO rules are likely to permit unilateral regulation of greenhouse gas emissions”, particularly when a State has “engaged in multilateral processes in good faith and these processes have stalemated”. However,

and “as far as possible”, a multilateral approach is strongly preferred”.<sup>370</sup> Additionally, although the decision provides for the adoption of unilateral measures for the protection of the environment, one of the three criteria that have to be satisfied to adopt such measures with extraterritorial effect is that diplomatic efforts to enter into an agreement with the State that is the subject of the measures must have been exhausted before such adoption.<sup>371</sup> Preference for multilateralism in addressing environmental issues by international organizations stems from the fact that environmental problems are global in nature and cannot be effectively dealt with by any single State.<sup>372</sup>

The principle of cooperation is a principle of international law and, accordingly, one of the important principles of international environmental law.<sup>373</sup> This principle “is the foundation for equitable utilisation, management, and conservation of shared natural resources”.<sup>374</sup> Since the atmosphere is one of the shared natural resources, this principle plays a vital role in the case of any environmental measure dealing with climate change and global warming. This principle essentially requires States to cooperate in addressing climate change and global warming. All international environmental agreements, whether bilateral or multilateral, or whether having regional or global application, affirm this obligation to co-operate.<sup>375</sup> As far as climate change and global warming are concerned, the principle of cooperation can be found in the *Rio Declaration* and the *UNFCCC*.<sup>376</sup> Moreover, the principle of cooperation is “reflected in the decisions and awards of

---

such regulation has to be applied in “a non-discriminatory manner and meet procedural safeguards of transparency and due process.”

<sup>370</sup> *United States – Import Prohibition of Certain Shrimp and Shrimp Products – Recourse to Article 21.5 of the DSU by Malaysia (Complaint by Malaysia, India, Pakistan, Thailand)* (2001), WTO Doc WT/DS58/AB/RW at para 124 (Appellate Body Report), online: WTO

[http://docs.wto.org/dol2fe/Pages/FE\\_Search/FE\\_S\\_S006.aspx?Query=%28@Symbol=%20wt/ds58/ab/rw\\*%20not%20r w2\\*%29&Language=ENGLISH&Context=FomerScriptedSearch&languageUIChanged=true](http://docs.wto.org/dol2fe/Pages/FE_Search/FE_S_S006.aspx?Query=%28@Symbol=%20wt/ds58/ab/rw*%20not%20r w2*%29&Language=ENGLISH&Context=FomerScriptedSearch&languageUIChanged=true) [*Shrimp-Turtle*].

<sup>371</sup> According to the *Shrimp-Turtle* decision, *ibid*, unilateral action for the protection of the environment is justified subject to three conditions:

- The State taking the measure must have a legitimate interest in the resource that it is seeking to protect;
- The resource concerned must be the subject of international measures aiming to protect them from further endangerment; and
- The State taking the measures must have exhausted prior diplomatic efforts to enter into an agreement with the State that is the subject of the measures.

See Sands, “Unilateralism”, *supra* note 108 at 299–300.

<sup>372</sup> See e.g. Ciolino, *supra* note 106 at 1181.

<sup>373</sup> See Birnie, Boyle & Redgwell, *supra* note 98 at 175–84; Sands et al, *supra* note 98 at 203–05. See also Pierre-Marie Dupuy, “The Place and Role of Unilateralism in Contemporary International Law” (2000) 11:1 Eur J Intl L 19 at 22–23.

<sup>374</sup> Birnie, Boyle & Redgwell, *supra* note 98 at 176 [footnote omitted].

<sup>375</sup> See Sands et al, *supra* note 98 at 204. See also Birnie, Boyle & Redgwell, *supra* note 98 at 176.

<sup>376</sup> See *Rio Declaration*, *supra* note 98, Principles 7, 27; *UNFCCC*, *supra* note 148, arts 3(3), (5), 4(1), Preamble.

international courts and tribunals”.<sup>377</sup> The International Law Commission’s 2001 *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*,<sup>378</sup> which “essentially codify existing obligations of environmental impact assessment, notification, consultation, monitoring, prevention, and diligent control of activities likely to cause transboundary harm”,<sup>379</sup> requires States to: (a) cooperate to the adoption of appropriate measures “to prevent or minimize the risk of transboundary harm or to minimize its effect”,<sup>380</sup> and (b) consult with States likely to be affected “with a view to agreeing measures to minimize or prevent the risk of harm”.<sup>381</sup> Therefore, all ICAO Contracting States must cooperate to reach a multilateral solution that offers better prospects for reducing emissions from aviation than a unilateral one.<sup>382</sup>

It will be inappropriate to assume that the unilateral extension of the EU ETS to cover emissions from aviation implies that the EU prefers unilateralism to multilateralism and, hence, does not respect the principle of cooperation. All the EU legislation dealing with emissions from aviation negate that inappropriate assumption. For example, it is stated in *Directive 2008/101*, which originally included aviation in the EU ETS, that the Union, along with its Member states, “shall continue to seek an agreement on global measures to reduce greenhouse gas emissions from aviation”.<sup>383</sup> It is also acknowledged that an international agreement “remains the best way of addressing” the issue of emissions from aviation.<sup>384</sup> Similarly, it is acknowledged in *Regulation 421/2014*, which amended the aviation segment of the EU ETS, that “[a] global approach to addressing emissions from international aviation offers the best prospects for ensuring sustainability in the long run”.<sup>385</sup> It is mentioned that the EU is endeavoring “to secure a future

---

<sup>377</sup> Sands et al, *supra* note 98 at 204. See *Lac Lanoux Arbitration (France v Spain)* (1957), 12 RIAA 281, 24 ILR 101 (Arbitral Tribunal); *MOX Plant Case (Ireland v United Kingdom)*, Case No 10, Provisional Measures (3 December 2001) (International Tribunal for the Law of the Sea); *Case concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v Singapore)*, Case No 12, Provisional Measures (8 October 2003) (International Tribunal for the Law of the Sea); Birnie, Boyle & Redgwell, *supra* note 98 at 176.

<sup>378</sup> “Draft articles on prevention of transboundary harm from hazardous activities” in *ILC Report of 53rd Session*, *supra* note 98, 146 [“Draft articles on prevention”].

<sup>379</sup> Birnie, Boyle & Redgwell, *supra* note 98 at 141.

<sup>380</sup> *Ibid* at 142; “Draft articles on prevention”, *supra* note 378 at 146, arts 3, 4.

<sup>381</sup> Birnie, Boyle & Redgwell, *supra* note 98 at 142; “Draft articles on prevention”, *supra* note 378 at 147, art 9.

<sup>382</sup> Bertele & Mey, *supra* note 110 at 203, contend that, since “[t]he power of political implications of...ecological change have the potential to generate significant upheaval – spiritual and philosophical, as well as economic and social[,] [t]he Western industrial societies, far from being able to truly solve these global problems, will need to band together strategically, simply to ensure their own preservation.”

<sup>383</sup> *Directive 2008/101*, *supra* note 8 at 15 [emphasis added].

<sup>384</sup> *Ibid* at 6.

<sup>385</sup> *Regulation 421/2014*, *supra* note 32 at 1.



international agreement to control greenhouse gas emissions from aviation”,<sup>386</sup> and the European Commission, on behalf of the Union, will continue to pursue bilateral and multilateral contacts with non-EEA States “in order to promote the use of market-based mechanisms to reduce emissions from aviation”.<sup>387</sup> As discussed, the unilateral initiative was adopted mainly due to the delay at ICAO to reach an agreement on a global market-based measure and, specifically, after ICAO’s CAEP had decided in 2004 to shelve the matter.<sup>388</sup> The EU unilateralism resumed the discussion of global market-based measures at ICAO. In this respect, at least, the EU’s unilateral move deserves admiration.

At present, airlines are willing to reduce their emissions through a single global market-based measure, and have already recommended to States to adopt the same for aviation, as appears from the resolution endorsed at the 69<sup>th</sup> Annual General Meeting of IATA.<sup>389</sup> Since it is the airlines which will be regulated under any prospective market-based measure, it is expected that this willingness on the part of the airlines and their recommendation to governments would motivate States to reach an agreement on a global market-based measure for international civil aviation at ICAO for implementation in 2020.

The foregoing discussion demonstrates that multilateral market-based measures should be preferred to unilateral ones for various reasons. However, unilateral measures should not be rejected *in toto*. Preliminary emissions data released by the European Commission in early 2015 demonstrates that aviation emissions from intra-EEA flights reduced to 54.7 million tons of CO<sub>2</sub> in 2014 from 84 million tons of CO<sub>2</sub> in 2012.<sup>390</sup> Since aviation has been included in the EU ETS since 2012, this fall in emissions from aviation can be attributed to the unilateral scheme. Again, airlines’ compliance with the EU ETS has increased after the scope of the scheme was reduced to intra-EEA flights in 2014, signaling acceptance of this unilateral market-based measure by a majority of non-EEA States as long as the measure does not have extra-territorial application.

Therefore, if States follow one single model of market-based measure as the EEA Member

---

<sup>386</sup> *Ibid.*

<sup>387</sup> *Ibid* at 2.

<sup>388</sup> See section 5.2, *above*.

<sup>389</sup> See International Air Transport Association, Press Release, 34, “Historic Agreement on Carbon-Neutral Growth” (3 June 2013), online: IATA <[www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx](http://www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx)>; Fiona Harvey, “Airlines agree to curb their greenhouse gas emissions by 2020”, *The Guardian* (4 June 2013,) online: The Guardian <[www.theguardian.com/environment/2013/jun/04/airlines-agree-to-curb-greenhouse-gas-emissions](http://www.theguardian.com/environment/2013/jun/04/airlines-agree-to-curb-greenhouse-gas-emissions)>.

<sup>390</sup> See “Aviation emissions covered by the EU ETS edge higher in 2014 to over 54 MtCO<sub>2</sub> as emissions from other sectors fall”, *GREENAIRonline.com* (17 April 2015), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2072](http://www.greenaironline.com/news.php?viewStory=2072)>.

States have done, it can bring significant benefit to the environment. The EU ETS (in its amended form) can serve as a model in this respect.<sup>391</sup> If non-EEA economically powerful States, like the US, Canada, China, and Russia, come forward by adopting their own emissions trading scheme of the same model,<sup>392</sup> it will significantly reduce emissions from aviation globally. Furthermore, airlines from those non-EEA States will be able to avoid complying with the EU ETS, since adoption of such measures by non-EEA States having “an environmental effect at least equivalent to that of” the EU ETS renders airlines of those non-EEA States qualified for exemption from the scheme.<sup>393</sup> A concerted practice of this nature, in the absence of a global market-based measure, can give rise to a global model that will significantly reduce emissions from aviation.<sup>394</sup> Such national or regional, in other words “unilateral”, measures of the same model adopted by economically powerful States will induce other States either to comply with these schemes or, if they want to be exempted, to develop and implement their own schemes following the same model. This inducement will occur because non-compliance by airlines from economically weak States will lead to banning of these airlines by those economically powerful States that will, in consequence, isolate these airlines from the global economy.<sup>395</sup> In addition to ensuring access to

---

<sup>391</sup> See also *Directive 2008/101*, *supra* note 8 at 5. Shaffer & Bodansky, *supra* note 123 at 33, observe that “[o]ther countries frequently model their laws on those” of the US or the EU.

<sup>392</sup> This author, in a policy paper regarding Canada-EU relationship co-authored by Professor Armand de Mestral, recommended that “Canada might introduce an emissions trading scheme applicable only to Canadian aircraft.” de Mestral & Ahmad, “EU Emissions”, *supra* note 191 at 6. Motaal, *supra* note 13 at 24, argues: “Even if the aviation industry chooses to attack the EU aviation ETS, a constructive way to do so would be to explore the built-in “exit” from the scheme that the EU crafted – that of “equivalent measures”. The EU says that any airline belonging to a country that takes equivalent climate-mitigation measures to those of the EC can be exempted from the ETS. Why have the airlines not explored this option?” See also Koh, *supra* note 281 at 140.

<sup>393</sup> *Directive 2008/101*, *supra* note 8 at 5, 14.

<sup>394</sup> The EU itself has recognized such potential. See *ibid* (“[b]ilateral arrangements on linking the Community scheme with other trading schemes to form a common scheme or taking account of equivalent measures to avoid double regulation could constitute a step towards global agreement” at 5).

<sup>395</sup> On the issue of blacklisting by the US and the EU for safety reasons, Dempsey, *supra* note 15 at 79, argues that, “[w]hen economically powerful States, such as the [US] and the [EU], blacklist a nation’s carriers, the economic impact can be severe.” See also Ahmad, “Achieving”, *supra* note 144 at 110, where this author explained how blacklisting by the US and the EU can affect economically feeble States in the following terms:

It is true that the global economy does not reside exclusively in the US or Europe. However, a huge portion of global economy resides exclusively in the US or the EU. The US and most of the EU countries fall within the High Income and the Upper Middle Income category, according to the classification prepared by the World Bank. The currencies of these economically strong countries are stronger than those of most economically weak countries. Hence, most feeble countries desire to obtain access to the markets of these economically strong countries to generate more revenue. These feeble countries export their products mainly to economically strong countries, such as the US and the EU countries, to get more value of their products. If the US or the EU countries impose a ban on those countries, it is highly likely that these feeble countries will lose money for want of suitable buyer. One can appreciate that more suitable buyer, more profit; less suitable buyer, less profit.

these lucrative markets, States will model their market-based measure on the EU ETS simply because it is easier to adopt an existing system, which has been “developed through relatively sophisticated technical administrative processes”, than to attempt to reinvent a system without possessing the necessary resources available to the US and Europe.<sup>396</sup>

As mentioned, the European Commission, on behalf of the EU, will continue to pursue bilateral and multilateral contacts with non-EEA States “in order to promote the use of market-based mechanisms to reduce emissions from aviation”.<sup>397</sup> It is suggested that, rather than stubbornly imposing the EU ETS, the Union should spend more time and effort in pursuing such contacts with non-EEA States. If States fail to reach an agreement in 2016, the EU should vigorously attempt to convince non-EEA economically powerful States to adopt national or regional market-based measure modelled on the EU ETS.<sup>398</sup> So far, the Union has not been successful in this respect, as discussed above.

While developing a market-based measure modeled on the EU ETS, it needs to be assured that any new measure must not suffer from surplus of emission allowances that largely weakened the scheme. More surplus of allowances cause the carbon price to drop and, without a higher carbon price, companies included in the scheme will not find the necessary incentive to change their behavior. A higher carbon price is one of the requisites for an emissions trading scheme, like the EU ETS, to work effectively to achieve its environmental objective. This observation equally applies to multilateral market-based measures.<sup>399</sup> The EU is aware of this weakness of the EU ETS and is taking action to deal with the surplus of emission allowances.<sup>400</sup>

## **5.5 Conclusion**

By reason of its unilateral action, the EU has gained a first-mover advantage in

---

<sup>396</sup> Shaffer & Bodansky, *supra* note 123 at 33.

<sup>397</sup> *Regulation 421/2014*, *supra* note 32 at 2.

<sup>398</sup> Van Schaik & Schunz, *supra* note 1 at 172, argue that, “[f]or the EU to be considered as an effective normative power, it would have to act predominantly according to norms, use its norms in its external policies and manage to define what is normal (that is, exert influence) at the international level.” According to them, to successfully exercise its power, the EU must have the capacity to influence the non-EEA States, “influence [being] defined as the ‘modification of an actor’s behavior, beliefs or preferences by acts of another actor exerted for the purpose of reaching the latter actor’s aims’”. See also *ibid* at 183–84.

<sup>399</sup> See also Allan Cook, “Accounting for Emissions: From Costless Activity to Market Operations” in David Freestone & Charlotte Steck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and Beyond* (Oxford: Oxford University Press, 2009) 59.

<sup>400</sup> See European Commission, “Structural reform of the European carbon market”, online: European Commission <[ec.europa.eu/clima/policies/ets/reform/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/reform/index_en.htm)>.

international civil aviation by its ability to use its norms, namely, the necessity of reducing emissions from international civil aviation, to define the problem with emissions from aviation that contribute to climate change and global warming, and to propose a solution, namely, a global market-based measure for international civil aviation. For the same reason, States have shown up at the negotiating table at ICAO, are discussing the issue of aviation emissions more vehemently than before, and have reached an agreement to develop a global market-based measure for international civil aviation. Importantly, due to the EU ETS, ICAO has speeded up its processes toward the reduction of emissions from international civil aviation.

Nonetheless, it has been demonstrated that the success of unilateral measures, like the EU ETS, in achieving their environmental goals is limited. Although unilateral environmental measures can produce new environmental norms, they frequently face protest from other States that often leads to trade war and damages necessary multilateral efforts. Additionally, the scope, intensity, and geographic extent for the mitigation of emissions is lesser in the case of unilateral measures than it is in the case of multilateral measures.<sup>401</sup> For example, the geographic scope of such measures is limited to the sovereign territory of State or group of States, whereas emissions occurring anywhere in the world hasten climate change and global warming due to the “transboundary nature of emissions”.<sup>402</sup> In the case of the EU ETS, it appears from the above discussion that the inclusion of aviation in the scheme has encountered objection from non-EEA States, giving rise to friction. It has thus been temporarily amended to limit its area of application to only within the EEA airspace.

The importance of the retreat of the EU from its original proposal, due to intense political pressure from non-EEA economically powerful States, should not be underestimated. This will affect its role as norm entrepreneur in other sectors. For example, although the EU has an obligation to reduce emissions from both aviation and maritime sectors under the *Kyoto Protocol* – working through ICAO and the IMO, respectively<sup>403</sup> – the European Commission has yet to include the shipping industry in the EU ETS, because, arguably, it is frightened by the huge political pressure it encountered in attempting to cover international aviation.<sup>404</sup>

---

<sup>401</sup> See Preston, Lee & Hooper, *supra* note 26 (“[a] global ETS could...have a greater scope for emissions mitigation and further the cause of a more sustainable aviation industry more effectively than regional initiative such as the EU ETS” at 54).

<sup>402</sup> *Ibid* at 53.

<sup>403</sup> See *Kyoto Protocol*, *supra* note 148, art 2(2).

<sup>404</sup> See Böhler, *supra* note 305 at 101.

To preserve its leading role in addressing climate change and global warming, the EU should change its course of action. Rather than only becoming successful in getting non-EEA States to the negotiating table, the EU should devote more time and effort to ensuring the smooth progression of that negotiation toward the achievement of an effective multilateral regime.<sup>405</sup> In international civil aviation, such a regime to effectively combat climate change and global warming can be achieved by agreeing to a global market-based measure. The EU's 2013 Impact Assessment of ETS on aviation, which was followed by the proposal from the European Commission to amend the scheme, suggested:

To address the problem of the global “gap” in emission coverage, any amendments to the EU ETS for aviation should aim to further facilitate the transition to a global [market-based measure] and to remove the political obstacles at the international level without compromising on the environmental integrity and the principle of non-discrimination.<sup>406</sup>

A negotiation cannot be successful if any of the parties to that negotiation remains adamant to its position.<sup>407</sup> The EU has already recognized this and, as a consequence, first deferred the application of the ETS to airlines of non-EEA States for one year, and finally amended the scheme by limiting its scope of application to intra-EEA flights only. Now, non-EEA States have to recognize the same by making any compromise that is necessary to reach an agreement regarding the implementation of a global market-based measure from or, if possible, before 2020 since, according to the Intergovernmental Panel on Climate Change, “[w]arming of the climate system is unequivocal”, and the processes of climate change and global warming are continuing at a much higher speed than before.<sup>408</sup> All ICAO Contracting States must collaborate among themselves, recognizing the international law principle of cooperation, and must endeavor to reconcile the differences between developing and developed States that appears to be the stumbling block in this respect. They must move the negotiation forward at a much higher speed than before.

---

<sup>405</sup> Reagan, *supra* note 10 at 351–52, argues that, rather than including international aviation in the EU ETS, the EU “should vigorously pursue multilateral international aviation emissions reductions through the International Civil Aviation Organization (ICAO).” Van Schaik & Schunz, *supra* note 1 at 178, argue that, to be regarded as a normative power, the EU “would also need to successfully upload these norms, or the positions derived from them, to the global level.” See also Reagan, *supra* note 10 at 383–84.

<sup>406</sup> *Impact Assessment 2013*, *supra* note 59 at 11.

<sup>407</sup> The ICJ, in the *North Sea Continental Shelf Cases*, asserted that insistence on one’s “own position without contemplating any modification to it” cannot lead to a meaningful negotiation. *North Sea Continental Shelf Cases (Federal Republic of Germany v Denmark; Federal Republic of Germany v Netherlands)*, [1969] ICJ Rep 3 at para 85.

<sup>408</sup> IPCC, “Summary for Policymakers” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 3 at 4.

Finally, although the EU ETS cannot effectively diminish emissions from aviation, the fact that it will cover 12.5 percent of emissions from international civil aviation should not be neglected. In the absence of a global market-based measure, the lead that the EU has taken deserves admiration from an environmental perspective since it addresses a substantial amount of global emissions.<sup>409</sup> Non-EEA States should not prohibit their flag carriers from complying with the EU ETS in its amended form (which does not have extra-territorial reach) and, the EU and its Member States must take necessary initiatives to conclude new or amend existing bilateral and/or multilateral agreements with non-EEA States to give way to the application of the EU ETS to non-EEA aircraft. As discussed, the adoption of market-based measures of the same type by economically powerful States, in the absence of a global market-based measure, can significantly reduce emissions from aviation. The EU has taken the lead; other economically powerful States should step in to consolidate the global effort against climate change and global warming.

---

<sup>409</sup> See e.g. Fahey, *supra* note 25 (“in all, EU ETS represents a major success on the part of the EU to regulate where other global governance mechanisms had failed” at 1260).

## **Chapter 6: Climate Change Governance and International Civil**

### **Aviation**

#### **6.1 Introduction**

The main thrust of this thesis is to evaluate the existing and proposed measures to govern emissions from international civil aviation that contribute to climate change and global warming, and, after due assessment, to explore and suggest ways to attain successful governance of such emissions. The thesis argues, and previous chapters have already demonstrated, that, to successfully govern emissions from international civil aviation, a temporary but mandatory, well-designed global market-based measure or unilateral market-based measures of the same model adopted by economically powerful States must be in place. Other endeavors to reduce emissions, e.g., improvement of technical measures, should not be discontinued. It has been suggested that market-based measures should be adopted on a priority basis to meet international civil aviation's goal of achieving carbon neutral growth from 2020, while work on other measures, particularly technical measures, should be continued to provide a permanent solution to the issues of climate change and global warming. Such endeavors to govern emissions that contribute to climate change and global warming can be termed climate change governance.<sup>1</sup> However, a detailed discussion of climate change governance and of ways to ensure successful governance in international civil aviation has not been performed in earlier chapters. This chapter performs that task.

Earlier discussions suggest that disagreement between developed and developing States on certain issues has made climate change governance in international civil aviation difficult. In fact, such differences have made climate change governance at the global level, not only in the aviation sector, difficult. Therefore, it is essential to identify the underlying causes that fuel those differences. The next section deals with this issue and endeavors to answer the following question: why can developed and developing States not agree on a binding global climate change agreement that is pivotal in ensuring successful climate change governance?

Since climate change governance in international civil aviation takes place at the global level, the concept of global governance is briefly explored in third section. That section provides

---

<sup>1</sup> Climate change governance is mainly focused on emissions reduction, since “[a]t the very heart of the response to climate change...lies the need to reduce emissions.” UN and Climate Change, “Towards a Climate Agreement”, online: UN <[www.un.org/climatechange/towards-a-climate-agreement/](http://www.un.org/climatechange/towards-a-climate-agreement/)> [UN, “Towards”].

a brief introduction to the concept of global governance, defines the requirements for a successful governance, identifies relevant actors in climate change governance, especially in the realm of international civil aviation, and discusses their role in the climate change governance structure in aviation sector. The fourth section addresses the issue of attaining successful climate change governance in international civil aviation with particular emphasis on the International Civil Aviation Organization [ICAO] and its governance structure. That section also suggests few recommendations on how successful governance can be achieved in international civil aviation. The fifth section provides the conclusion.

## **6.2 Disagreement between developed and developing States: the principal reason causing slow or no progress toward a legally binding global climate change deal**

### **6.2.1 Introduction**

The latest session of the ICAO Assembly, i.e. 38<sup>th</sup> Session, reveals that the disagreement between developed and developing States on certain issues is the principal reason why States are delaying to agree on a global market-based measure for international civil aviation.<sup>2</sup> Such a divergence of attitudes between developed and developing States is not unique in the field of aviation; this “is evident across the entire economic spectrum.”<sup>3</sup> To appropriately appreciate these developed-developing world polemics, one needs to go beyond the aviation arena to the broader global arena of climate change negotiation that commenced in 1979 when the first World Climate Conference took place.<sup>4</sup> The ongoing climate change debate in aviation is a microcosm of the broader global climate change debate. The current situation in aviation with respect to addressing aviation’s climate change and global warming impacts is the reflection of the situation in the global climate change debate under the *United Nations Framework Convention on Climate Change*<sup>5</sup> [UNFCCC] process where States are negotiating to reach a binding post-Kyoto climate change

---

<sup>2</sup> See ch 4, *above*. These issues include: representation of developing States in ICAO processes; the principle of common but differentiated responsibilities; the principle of special circumstances and respective capabilities; the concept of *de minimis* threshold granting exemption from any proposed national or regional market-based measure on routes to and from developing States whose share of international civil aviation activities is below certain threshold before the implementation of any global market-based measure; and ICAO aspirational goal.

<sup>3</sup> Michael Milde, “The EU Emissions Trading Scheme: Confrontation or Compromise?: A Unilateral Action Outside the Framework of ICAO” (2012) 61:2 ZLW 173 at 176.

<sup>4</sup> See UN, “Towards”, *supra* note 1.

<sup>5</sup> *United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, Can TS 1994 No 7 (entered into force 21 March 1994) [UNFCCC].



agreement.<sup>6</sup>

### **6.2.2 States' knowledge of climate change and global warming**

The latest, i.e., fifth, assessment report of the Intergovernmental Panel on Climate Change [IPCC] concluded that “[w]arming of the climate system is unequivocal”, and the processes of climate change and global warming are continuing at a much higher speed than before thereby risking the existence of all living species on Earth.<sup>7</sup> The IPCC was created in 1988 by the World Meteorological Organization [WMO] and the United Nations Environment Program [UNEP] “to prepare, based on available scientific information, assessments on all aspects of climate change and its impacts, with a view of formulating realistic response strategies.”<sup>8</sup> The IPCC’s current role is:

to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of *human-induced climate change*, its potential impacts and options for adaptation and mitigation. IPCC reports should be *neutral* with respect to policy, although they may need to deal objectively with scientific, technical and socio-economic factors relevant to the application of particular policies.<sup>9</sup>

The assessment reports of the IPCC “are developed through multiple rounds of drafting and review.”<sup>10</sup> During the development of the reports, governments of the IPCC Member States endorse the reports.<sup>11</sup> The endorsement process is based on a dialogue between the governments

---

<sup>6</sup> See e.g. EC, Commission, *Commission Staff Working Document: Impact Assessment Accompanying the Document Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowances trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions*, SWD(2013) 430 final (Brussels: EC, 2013) at 10, online: European Commission <[ec.europa.eu/clima/policies/transport/aviation/docs/swd\\_2013\\_430\\_en.pdf](http://ec.europa.eu/clima/policies/transport/aviation/docs/swd_2013_430_en.pdf)> [*Impact Assessment 2013*] (“[t]he spill-overs from the UNFCCC negotiations have complicated the ICAO negotiations” at 10).

<sup>7</sup> IPCC, “Summary for Policymakers” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 3 at 4 [IPCC, “Summary: Physical Science”].

<sup>8</sup> Intergovernmental Panel on Climate Change, “History”, online: IPCC <[www.ipcc.ch/organization/organization\\_history.shtml](http://www.ipcc.ch/organization/organization_history.shtml)>.

<sup>9</sup> *Principles Governing IPCC Work*, 1 October 1998 (approved at the Fourteenth Session (Vienna, 1–3 October 1998) on 1 October 1998, amended at the Twenty-First Session (Vienna, 3 and 6–7 November 2003), the Twenty-Fifth Session (Mauritius, 26–28 April 2006), the Thirty-Fifth Session (Geneva, 6–9 June 2012) and the Thirty-Seventh Session (Batumi, 14–18 October 2013)), online: IPCC <[www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf](http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf)> [emphasis added] [*IPCC Principles*].

<sup>10</sup> Intergovernmental Panel on Climate Change, *IPCC Factsheet: How Does the IPCC Approve Reports?*, online: IPCC <[www.ipcc.ch/news\\_and\\_events/docs/factsheets/FS\\_ipcc\\_approve.pdf](http://www.ipcc.ch/news_and_events/docs/factsheets/FS_ipcc_approve.pdf)> [*IPCC Factsheet: Approve*].

<sup>11</sup> See *ibid.* See also *IPCC Principles*, *supra* note 9.

and the scientists.<sup>12</sup> This endorsement by governments of the IPCC Member States “acknowledges that the report is a definitive assessment that has been developed following the IPCC’s defined procedures, underpinning the report’s authority.”<sup>13</sup> Any Member States of the United Nations [UN] and WMO can participate in the work of the IPCC and 195 States are currently members of the IPCC.<sup>14</sup> Therefore, 195 States, i.e. almost the entire world,<sup>15</sup> have endorsed the conclusion of the IPCC fifth assessment report that climate system is warming unambiguously, and the speed of climate change and global warming processes is higher than before thus risking the existence of all living species on Earth. Nonetheless, to date, States have failed to agree on a binding post-Kyoto climate change agreement.

### **6.2.3 The current state of the global climate change regime**

There exists a global climate change regime, which comprises the *UNFCCC* and the *Kyoto Protocol* to the same,<sup>16</sup> to reduce anthropogenic emissions. In addition to these binding legal instruments, there also exist some non-binding agreements, e.g., the *Copenhagen Accord*,<sup>17</sup> the *Cancun Agreements*,<sup>18</sup> the *Lima Call for Climate Action*,<sup>19</sup> which were agreed under the UNFCCC

---

<sup>12</sup> See *IPCC Factsheet: Approve*, *supra* note 10.

<sup>13</sup> *Ibid.*

<sup>14</sup> See Intergovernmental Panel on Climate Change, “Organization”, online: IPCC <[www.ipcc.ch/organization/organization.shtml](http://www.ipcc.ch/organization/organization.shtml)>; *IPCC Principles*, *supra* note 9. Regarding the IPCC, Helm states: The IPCC processes and reports have, not surprisingly, been controversial, but the IPCC has largely achieved its main aims. It has provided the international scientific forum for analysis and debate, and although its conclusions have had to be negotiated, they have proved remarkably robust. Dissenting academics and others have from time to time cried foul, and in important respects they have been proved right. However, it is notable that this dissent has been more heavily focused on the economics and policy aspects and less on the pure science.

Dieter Helm, “Climate-change Policy: Why has so Little been Achieved?” in Dieter Helm & Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009) 9 at 16 [footnote omitted].

<sup>15</sup> See US, Department of State, *Independent States in the World: Fact Sheet* (Washington DC: Bureau of Intelligence and Research, US Department of State, 2015), online: US Department of State <[www.state.gov/s/inr/rls/4250.htm](http://www.state.gov/s/inr/rls/4250.htm)> (visited August 20, 2015).

<sup>16</sup> *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 162 (entered into force 16 February 2005) [*Kyoto Protocol*].

<sup>17</sup> *Copenhagen Accord*, 18 December 2009, in UNFCCC, *Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009. Addendum. Part Two: Action taken by the Conference of the Parties at its fifteenth session*, UNFCCC Conference of the Parties, 15th Sess, Doc FCCC/CP/2009/11/Add.1 (2010), 4, online: UNFCCC <[unfccc.int/documentation/documents/advanced\\_search/items/6911.php?priref=600005735](http://unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600005735)> [*Copenhagen Accord*].

<sup>18</sup> To read all the three agreements, see UNFCCC, “Documents & Decisions”, online: UNFCCC <[unfccc.int/documentation/decisions/items/3597.php?such=j&volltext=%22cancun%20agreements%22](http://unfccc.int/documentation/decisions/items/3597.php?such=j&volltext=%22cancun%20agreements%22)>.

<sup>19</sup> *Lima Call for Climate Action*, UNFCCC COP Dec 1/CP.20 in UNFCCC, *Report of the Conference of the Parties on its twentieth session, held in Lima from 1 to 14 December 2014. Addendum. Part two: Action taken by the Conference of the Parties at its twentieth session*, UNFCCC Conference of the Parties, 20th Sess, Doc

process to address the same. The Kyoto first commitment period ended in 31 December 2012. On December 2012, States agreed to the Kyoto second commitment period.<sup>20</sup> However, at the time of this writing in 2015, the second commitment period has not become effective due to a lack of required number of instruments of acceptance.<sup>21</sup>

It is argued that the existing legally binding instruments cannot significantly reduce global greenhouse gas emissions.<sup>22</sup> In fact, the tendency of States to agree to the lowest common denominator in concluding international environmental agreements is responsible for this weakness.<sup>23</sup> The title of the *UNFCCC* tells us about the nature of the Convention: it is a framework convention. Thus, the Convention did not establish any quantitative commitments to limit greenhouse gas emissions; it “ultimately established only an aspirational commitment from industrialized countries to control these emissions in the future.”<sup>24</sup> Unlike the *UNFCCC*, the *Kyoto Protocol* established quantitative restrictions on emissions from industrialized economies, which mended the weakness of the *UNFCCC*.<sup>25</sup> However, one of the largest emitters of greenhouse gases, namely the United States [US], never ratified the Protocol and another big emitter, Canada,

---

UNFCCC/CP/2014/10/Add.1 (2015) 2, online: UNFCCC <[unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf](http://unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf)> [*Lima Climate Action*].

<sup>20</sup> See *Doha amendment to the Kyoto Protocol*, 8 December 2012, C.N.718.2012.TREATIES-XXVII.7.c, online: UN <[treaties.un.org/doc/Publication/CN/2012/CN.718.2012-Eng.pdf](http://treaties.un.org/doc/Publication/CN/2012/CN.718.2012-Eng.pdf)> [*Doha amendment*].

<sup>21</sup> For the amendments to become effective, a total of 144 instruments of acceptance are required. However, at the time of this writing, only 41 instruments of acceptance have been submitted. For updated information, see online: UN Treaty Collection <[treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-7-c&chapter=27&lang=en](http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-c&chapter=27&lang=en)> (visited August 20, 2015).

<sup>22</sup> See Paul G Harris, *What's Wrong with Climate Politics and How to Fix It* (Cambridge: Polity Press, 2013) (“[e]ven if fully implemented – which is not happening – all international agreements on climate change would not be enough to reverse global warming” at 13). See also Helm, *supra* note 14 at 10.

<sup>23</sup> See e.g. John Vogler, “Mainstream Theories: Realism, Rationalism and Revolutionism” in Paul G Harris, ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014) 30 at 36.

<sup>24</sup> Sean T Fox, “Responding to Climate Change: The Case for Unilateral Trade Measures to Protect the Global Atmosphere” (1996) 84:7 *Geo LJ* 2499 at 2499 [footnote omitted] (HeinOnline). *UNFCCC*, *supra* note 5, art 2, provides:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system...

<sup>25</sup> *Kyoto Protocol*, *supra* note 16, art 3, requires the Annex I Parties to ensure, individually or jointly, that their aggregate anthropogenic carbon dioxide equivalent (CO<sub>2</sub>e) emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated according to “their quantified emission limitation and reduction commitments inscribed in Annex B..., with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the [first] commitment period 2008 to 2012.” Furthermore, Annex I developed State Parties are required, by 2005, to “have made demonstrable progress in achieving its commitments under this Protocol.”

withdrew from the Protocol at the end of the first commitment period.<sup>26</sup> Additionally, current large emitters of greenhouse gases,<sup>27</sup> e.g., China, India, were not categorized as industrialized economies under the *Kyoto Protocol* in 1997 due to their status as developing States. All these weakened the effectiveness of the *Kyoto Protocol* and, consequently, global efforts to reduce greenhouse gases.

In the recent sessions of the Conference of the Parties [COP] of the *UNFCCC* and Conference of the Parties serving as the Meeting of the Parties to the *Kyoto Protocol* [CMP] held in Lima, Peru, from 1 to 14 December 2014, the elements of a draft negotiating text for a protocol, another legal instrument or an agreed outcome with legal force under the *UNFCCC* applicable to all Parties to the *UNFCCC*, which will hopefully be adopted at the next sessions of COP and CMP at the end of 2015, were elaborated.<sup>28</sup> Although opinions on the success of the Lima decision, namely the *Lima Call for Climate Action* that accompanies the draft negotiating text, are mixed,<sup>29</sup> the new climate change agreement will not come into effect before 2020, if adopted.<sup>30</sup> Since the Kyoto first commitment period has ended and the second commitment period has yet to become effective, the fact that the new climate agreement, if adopted, will become effective from 2020 means that States will not have any quantitative emissions reduction commitments till 2020! In such a circumstance, the inevitable question that arises is: why do States continuously fail or are delaying to agree on a binding climate agreement when they have accepted the IPCC conclusion

---

<sup>26</sup> See UNFCCC, “Status of Ratification of the Kyoto Protocol”, online: UNFCCC <[unfccc.int/kyoto\\_protocol/status\\_of\\_ratification/items/2613.php](http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php)>.

<sup>27</sup> See World Resources Institute, “CAIT - Country Greenhouse Gas Emissions Data”, online: World Resources Institute <[www.wri.org/resources/data-sets/cait-country-greenhouse-gas-emissions-data](http://www.wri.org/resources/data-sets/cait-country-greenhouse-gas-emissions-data)>.

<sup>28</sup> See *Lima Climate Action*, *supra* note 19.

<sup>29</sup> See Robert Stavins, “Assessing the Outcome of the Lima Climate Talks” (14 December 2014), *An Economic View of the Environment* (blog), online: <[www.robertstavinsblog.org/2014/12/14/assessing-the-outcome-of-the-lima-climate-talks/](http://www.robertstavinsblog.org/2014/12/14/assessing-the-outcome-of-the-lima-climate-talks/)>; Chris Lang, “The Lima Call for Climate Action: Low on ambition, low on finance, low on climate justice, low on action”, *redd-monitor.org* (16 December 2014), online: redd-monitor.org <[www.redd-monitor.org/2014/12/16/the-lima-call-for-climate-action-low-on-ambition-low-on-finance-low-on-climate-justice-low-on-action/](http://www.redd-monitor.org/2014/12/16/the-lima-call-for-climate-action-low-on-ambition-low-on-finance-low-on-climate-justice-low-on-action/)>; Suzanne Goldenberg, “Lima climate change talks reach global warming agreement”, *EurActiv.com* (15 December 2014), online: EurActiv.com <[www.euractiv.com/sections/climate-environment/lima-climate-change-talks-reach-global-warming-agreement-310800](http://www.euractiv.com/sections/climate-environment/lima-climate-change-talks-reach-global-warming-agreement-310800)>; Scott Sutherland, “Updated: Lima Call for Climate Action gives hope for new global climate agreement”, *The Weather Network* (16 December 2014), online: The Weather Network <[www.theweathernetwork.com/news/articles/lima-climate-conference-final-day-mix-concern-uncertainty-optimism/41808/](http://www.theweathernetwork.com/news/articles/lima-climate-conference-final-day-mix-concern-uncertainty-optimism/41808/)>; “UN members agree deal at Lima climate talks”, *BBC News* (14 December 2014), online: BBC News <[www.bbc.com/news/science-environment-30468048](http://www.bbc.com/news/science-environment-30468048)>; Richard Falk & Hilal Elver, “The World can’t afford more Limas: Future Climate Change Conferences require global leadership from the US and China”, *AlJazeera [America]* (20 December 2014), online: AlJazeera America <[america.aljazeera.com/opinions/2014/12/lima-climate-changeconferenceunitednationsgreenhousegasemissions.html](http://america.aljazeera.com/opinions/2014/12/lima-climate-changeconferenceunitednationsgreenhousegasemissions.html)>; Dave Cohen, “The “Lima Call For Action”” (16 December 2014), *Decline of the Empire* (blog), online: <[www.declineoftheempire.com/2014/12/the-lima-call-to-action.html](http://www.declineoftheempire.com/2014/12/the-lima-call-to-action.html)>.

<sup>30</sup> See *Lima Climate Action*, *supra* note 19.

that climate system is warming unambiguously and the speed of climate change and global warming processes is higher than before?

#### **6.2.4 The existence of climate change deniers**

We should remember that climate change deniers or skeptics exist,<sup>31</sup> some of whom are leaders of the world's greatest greenhouse gas emitter States.<sup>32</sup> The climate change deniers refute the existing scientific evidence of anthropogenic climate change and global warming. The “denial machine” consists of contrarian scientists, the fossil fuel industry, conservative politicians, conservative think tanks, conservative media and pundits, amateur climate bloggers and self-designated bloggers, public relations firms, astroturf groups, and various front groups.<sup>33</sup> In an attempt to prove that scientists attached to the IPCC “had invented, hidden or fudged data to prove that the climate is warming”, those deniers did not even hesitate to use thousands of personal emails of those scientists that were *illegally* stolen from computers at the Climate Research Unit of the University of East Anglia.<sup>34</sup> Several independent investigations from different States, universities, and government bodies were conducted that cleared the scientists of any wrongdoing.<sup>35</sup> Even after this, some climate change denier institutes, namely the Cato and Heartland institutes,<sup>36</sup> continued to make their allegations.<sup>37</sup> Denying the scientific evidence

---

<sup>31</sup> See e.g. William Marsden, *Fools Rule: Inside the Failed Politics of Climate Change* (Toronto: Alfred A Knopf Canada, 2011) at 208–29; David Suzuki Foundation, *Climate Change Deniers*, online: David Suzuki Foundation <davidsuzuki.org/issues/climate-change/science/climate-change-basics/climate-change-deniers/>; Jeffrey Kluger, “The Climate Deniers’ Newest Argument”, *Time* (29 September 2014), online: Time <time.com/3445231/climate-denier-settled-science/>.

<sup>32</sup> See e.g. Mark Kennedy, “Stephen Harper and Australia's Tony Abbott won't let climate policies kill jobs”, *Ottawa Citizen* (9 June 2014), online: Ottawa Citizen <ottawacitizen.com/news/national/stephen-harper-and-australias-tony-abbott-wont-let-climate-policies-kill-jobs>; Mike De Souza, “Stephen Harper’s climate change timeline” (19 September 2014), *Mike De Souza* (blog), online: <mikedesouza.com/2014/09/19/stephen-harpers-climate-change-timeline/>; Katharine Mieszkowski, “Bush: Global Warming is Just Hot Air”, *Salon* (10 September 2004), online: Salon <www.salon.com/2004/09/10/bush\_276/>; Mike De Souza, “Joe Oliver casts doubt on climate science in defence of oilsands”, *Canada.com* (12 April 2013), online: Canada.com <o.canada.com/technology/environment/blog-joe-oliver-casts-doubt-on-climate-science-in-defence-of-oilsands/>.

<sup>33</sup> See Riley E Dunlap & Aaron M McCright, “Organized Climate Change Denial” in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 144 at 144.

<sup>34</sup> Marsden, *supra* note 31 at 215. See also Haydn Washington & John Cook, *Climate Change Denial: Heads in the Sand* (London, UK: Earthscan, 2011) at 43–45; Skeptical Science, “What do the 'Climategate' hacked CRU emails tell us?”, online: Skeptical Science <www.skepticalscience.com/Climategate-CRU-emails-hacked-intermediate.htm>.

<sup>35</sup> *Ibid.*

<sup>36</sup> To learn more about climate change denier institutes, see Washington & Cook, *supra* note 34, ch 4.

<sup>37</sup> See Marsden, *supra* note 31 at 215–16.

related to climate change and global warming is not the sole purpose of the climate change deniers. They aim to spread doubt about the science by employing various methods, e.g., questioning the honesty of the climate scientists, so that people get confused and do not put a pressure on their respective governments to enact regulations addressing greenhouse gas emissions.<sup>38</sup>

### **6.2.5 The global fossil fuel industry**

As noted, the fossil fuel industry, i.e. coal, natural gas, and oil companies, is one of the actors of the “denial machine”. It is a crucial actor since, in a good number of cases, the climate change deniers are supported and/or influenced by the fossil fuel industry.<sup>39</sup> The fossil fuel industry “around the world [keeps] pushing the envelope, lobbying politicians to take no action that will slow their growth.”<sup>40</sup> According to the IPCC fifth assessment report, the atmospheric concentrations of carbon dioxide (CO<sub>2</sub>), one of the greenhouse gases, “have increased by 40% since pre-industrial times, *primarily from fossil fuel emissions*”.<sup>41</sup> Therefore, combating climate change and global warming will require reducing the use of fossil fuels. Hence, it is self-explanatory why the fossil fuel industry is supporting the deniers. Fossil fuel is “a key source of energy for economic development”;<sup>42</sup> the “global economy and human livelihoods are currently heavily dependent on fossil fuels”.<sup>43</sup> This is another reason why global leaders are reluctant to curb growing greenhouse gas emissions.<sup>44</sup> States’ dependence on fossil fuel, which is uneven though,<sup>45</sup> grants the fossil fuel industry enormous leverage in influencing the views and climate policy decisions of leaders of States as well.<sup>46</sup> Unless such dependence is significantly reduced, climate

---

<sup>38</sup> See also Washington & Cook, *supra* note 34 at 71–80.

<sup>39</sup> See e.g. David Suzuki, “Investigation Hits at Climate Change Denier's "Science"”, *The Huffington Post* (14 July 2011), online: The Huffington Post <[www.huffingtonpost.ca/david-suzuki/climate-change-denial\\_b\\_896543.html](http://www.huffingtonpost.ca/david-suzuki/climate-change-denial_b_896543.html)>; Washington & Cook, *supra* note 34, ch 4; Dunlap & McCright, *supra* note 33 at 148; Marsden, *supra* note 31 at 208–29; L Hunter Lovins & Boyd Cohen, *Climate Capitalism: Capitalism in the Age of Climate Change*, 1st ed (New York: Hill and Wang, 2011) at 232–33; David Suzuki Foundation, *supra* note 31.

<sup>40</sup> Marsden, *supra* note 31 at 222.

<sup>41</sup> IPCC, “Summary: Physical Science”, *supra* note 7 at 11 [emphasis added]. See also Matthew J Hoffmann, “Global Climate Change” in Robert Falkner, ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013) 3 (“[t]he world’s economy significantly runs on fossil fuel use” at 6).

<sup>42</sup> Hugh C Dyer, “Energy and Climate Change” in Paul G Harris, ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014) 361 at 361.

<sup>43</sup> *Ibid* at 362.

<sup>44</sup> See generally Marsden, *supra* note 31 at 222–29.

<sup>45</sup> See e.g. Hoffmann, *supra* note 41 (“[w]hile the global economy runs on fossil fuels, there is disparity between consumers and producers of fossil fuels – in other words some countries produce a lot of fossil fuels, others consume a lot of fossil fuels, and many that consume less would like to consume more” at 6).

<sup>46</sup> See e.g. Marsden, *supra* note 31, ch 9.

change deniers will exist and global leaders will continue to demonstrate reluctance to restrain greenhouse gas emissions mainly due to funding from and lobbying by the fossil fuel industry, respectively. The number of deniers of ozone layer depletion caused by chlorofluorocarbons (CFCs) substantially decreased mainly due to lack of funding from any concerned powerful industry, e.g., the refrigeration industry, that found economic alternatives to CFCs.<sup>47</sup>

### **6.2.6 The politics of climate change: States' sovereignty and their concern over short-term self-interest**

It is argued that the issues of climate change and global warming are more political than scientific in nature.<sup>48</sup> It is further argued that the political dimensions of climate change and global warming are more crucial than their technical ones.<sup>49</sup> Climate change negotiations have been driven by, *inter alia*, political, economic, and environmental concerns of States.<sup>50</sup> These arguments answer the question why States have yet to agree on a binding climate agreement when they have accepted the scientific conclusion of IPCC.

The politics of climate change has broadly divided States into two groups: developed and developing States. This division is recognized in the climate change regime as well.<sup>51</sup> Under the regime, developed States are deemed to bear more responsibility than developing ones with respect to reducing emissions. Developed States have more responsibility due to their historical contribution to the creation of the problem and their ability to more effectively address the same.<sup>52</sup>

---

<sup>47</sup> See Washington & Cook, *supra* note 34 at 73.

<sup>48</sup> See Harris, *supra* note 22 at 2.

<sup>49</sup> See *ibid.* See also Ronnie D Lipschutz & Felicia Allegra Peck, "Climate Change, Globalization, and Carbonization" in Bryan S Turner, ed, *The Routledge International Handbook of Globalization Studies* (New York: Routledge, 2010) 182 at 198.

<sup>50</sup> See Lorraine Elliott, *The Global Politics of the Environment*, 2nd ed (New York: New York University Press, 2004) at 82.

<sup>51</sup> See Arunabha Ghosh & Ngaire Woods, "Governing Climate Change: Lessons from other Governance Regimes" in Dieter Helm & Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009) 454 at 454:

At the heart of the existing climate-change regime is a divide between developed and developing countries. The UN Framework Convention on Climate Change (UN FCCC) enshrines 'common but differentiated responsibilities and respective capabilities' and in so doing recognizes that historical responsibility for climate change rests with developed countries and that they have greater capacity to address the problem.

<sup>52</sup> See UNFCCC, *supra* note 5; *Kyoto Protocol*, *supra* note 16. The regime divides States into three groups, namely Annex I, Annex II, and non-Annex I. Annex I is composed of developed States and States with economies in transition; Annex II consists of all Annex I States except the States with economies in transition; and non-Annex I comprises mostly developing States. See UNFCCC, "Parties & Observers", online: UNFCCC <[unfccc.int/parties\\_and\\_observers/items/2704.php](http://unfccc.int/parties_and_observers/items/2704.php)>. Hence, it can be observed that the division is mainly between two groups, i.e. developed and developing States, since Annex II parties are also Annex I parties.

However, States' concern over their own political, economic, and environmental interests has fragmented these broad groups into several interest-based groups.<sup>53</sup>

In global climate change negotiations, the largest group is the group of developing States, called the Group of 77 [G-77] and China.<sup>54</sup> Not all developing States are members of this group, and there exist several other coalitions of developing States formed by both members and non-members of G-77, e.g., the group of African States, the coalition of some 40 low-lying island States, called the Small Island Developing States [SIDS], who are particularly vulnerable to sea-level rise, and the group of Least Developed Countries [LDCs] formed by 48 States defined as LDCs by the UN.<sup>55</sup> There exist several other groups formed by either developed States or both developed and developing States. These groups include the European Union [EU] representing its twenty-eight Member States all of which are developed States; the Umbrella Group usually made up of Australia, Canada, Japan, New Zealand, Kazakhstan, Norway, the Russian Federation, Ukraine, and the US; the Environmental Integrity Group comprising Mexico, Liechtenstein, Monaco, South Korea, and Switzerland; States from the Organization of Petroleum Exporting Countries [OPEC]; a group of States of Central Asia, the Caucasus, Albania, and Moldova; States of the Cartagena Dialogue; and the Independent Alliance of Latin America and the Caribbean.<sup>56</sup>

The formation of such coalitions has both merits and demerits in the climate change negotiation. Since it is difficult to negotiate with each State individually, such groupings “make the negotiations manageable,...[and] reduce the complexity of the issues and the numbers of negotiating groups.”<sup>57</sup> It can also “reduce transaction costs for countries by helping them to pool their resources and increase their negotiation leverage.”<sup>58</sup> States can use these coalitions “to put issues on the agenda, to negotiate a point of view, and to modify or break a consensus.”<sup>59</sup> Nonetheless, one of the disadvantages is that, though theoretically States possess the flexibility to

---

<sup>53</sup> See generally Joyeeta Gupta, “*On Behalf of My Delegation,...*”: *A Survival Guide for Developing Country Climate Negotiators* (Washington DC: Center for Sustainable Development of the Americas & International Institute for Sustainable Development, 2000) ch 6 [Gupta, *On Behalf*].

<sup>54</sup> See UNFCCC, “Party Groupings”, online: UNFCCC <[unfccc.int/parties\\_and\\_observers/parties/negotiating\\_groups/items/2714.php](http://unfccc.int/parties_and_observers/parties/negotiating_groups/items/2714.php)> [UNFCCC, “Party”]. To learn more about this Group of 77 [G-77] and China, see Gupta, *On Behalf*, *supra* note 53, ch 7.

<sup>55</sup> See UNFCCC, “Party”, *supra* note 54. See also Gupta, *On Behalf*, *supra* note 53 at 35–38.

<sup>56</sup> See UNFCCC, “Party”, *supra* note 54.

<sup>57</sup> Gupta, *On Behalf*, *supra* note 53 at 33.

<sup>58</sup> *Ibid.*

<sup>59</sup> *Ibid.*



maneuver in different groups, practically they cannot leave coalitions easily.<sup>60</sup> Different groups can, and do, have different, and often conflicting, opinions that can slow the progress of negotiation. In fact, divergent positions of different groups is one of the main reasons why climate change negotiations have yet to attain significant progress.

Both developed and developing States desire to develop and are unwilling to take any action that they perceive to hinder the speed of their development.<sup>61</sup> They view that any action to curb their emissions can negatively affect their economic growth.<sup>62</sup> The developing world contends that the developed world has already used their share of the global atmospheric commons and, hence, it is now their turn to use what is left.<sup>63</sup> On the contrary, some States in the developed world, especially the US, are not interested in limiting their emissions unless large emitter developing States, especially China, undertake to limit their emissions.<sup>64</sup> In response, developing States “demand firm legal obligations for developed economies *before* making any policy commitments themselves”.<sup>65</sup> While most developing States are concerned with international financial and technological support, major greenhouse gas emitter developing States, namely, China, India, Brazil, and South Africa, together called the BASIC group, “want freedom of national economic

---

<sup>60</sup> See *ibid.*

<sup>61</sup> See e.g. Joyeeta Gupta, “Changing North-South Challenges in Global Environmental Politics” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 97 at 99 [Gupta, “Changing”]; Harris, *supra* note 22 at 20.

<sup>62</sup> For example, in June 2014, Canadian Prime Minister Stephen Harper and Australian Prime Minister Tony Abbot stated that “they won’t take any action to battle climate change that harms their national economies and threatens jobs.” Kennedy, *supra* note 32.

<sup>63</sup> See e.g. Asim Zia, *Post-Kyoto Climate Governance: Confronting the Politics of Scale, Ideology, and Knowledge* (Oxford: Routledge, 2013) at 2–3; Sivan Kartha, “Discourses of the Global South” in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 504 at 507–09.

<sup>64</sup> See e.g. Hoffmann, *supra* note 41 at 10; Harris, *supra* note 22 at 20. It is hoped that the argument of the two big emitter States, namely the US and China, that it will commit to reduce their greenhouse gas emissions if the other undertakes to do the same would fade away by reason of the climate change agreement reached between the US and China in November 2014 to curb their greenhouse gas emissions by 2030. It is expected that this will facilitate the progress and signing of a new post-Kyoto binding climate change agreement. See generally Simon Hansen, “The China-US Climate Change Agreement is a Step Forward for Green Power Relations”, *The Guardian* (14 November 2014), online: The Guardian <[www.theguardian.com/commentisfree/2014/nov/14/the-china-us-climate-change-agreement-is-a-step-forward-for-green-power-relations](http://www.theguardian.com/commentisfree/2014/nov/14/the-china-us-climate-change-agreement-is-a-step-forward-for-green-power-relations)>; David Biello, “Everything You Need to Know about the U.S.–China Climate Change Agreement: A turning point has been reached in the world’s bid to curb global warming”, *Scientific American* (12 November 2014), online: Scientific American <[www.scientificamerican.com/article/everything-you-need-to-know-about-the-u-s-china-climate-change-agreement/](http://www.scientificamerican.com/article/everything-you-need-to-know-about-the-u-s-china-climate-change-agreement/)>. To view the agreement, see *U.S.–China Joint Announcement on Climate Change*, 12 November 2014, online: The White House <[www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change](http://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change)>.

<sup>65</sup> Radoslav Dimitrov, “The Politics of Persuasion: UN Climate Change Negotiations” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 72 at 77 [emphasis in original]. See also Hoffmann, *supra* note 41 at 9–10; Elliott, *supra* note 50 at 83.

development unencumbered by legal treaty obligations.”<sup>66</sup> In terms of total emissions, major emitting developing States emit as much or more CO<sub>2</sub> as do the major emitting developed States.<sup>67</sup> However, in terms of per capita emissions, major emitting developed States are far ahead than major emitting developing States.<sup>68</sup> This significant difference partially reflects the enormous lifestyle gap between developed and developing States.<sup>69</sup> Therefore, by pointing at the significant difference between developed and developing States in terms of per capita emissions along with the historical emissions from the developed world, these developing States do not intend to commit to reduce their emissions that is essential, as they argue, to improve the living standard of their own citizens.<sup>70</sup>

Additionally, many developing States are skeptical “about the prospect of new regulatory arrangements”, since they are concerned that “a small group of powerful, industrialized countries will mostly ‘do’ the regulating, leaving them highly constrained, but marginalized, with little influence or control over the rules and their application.”<sup>71</sup> Heavily forested developing States, e.g., Indonesia, Congo, and Brazil, intend to “reap...financial benefits from a global agreement rewarding forest conservation for the sake of climate change abatement”, and, hence, “carefully negotiate institutional arrangements and financial details and, given the right incentives, would break ranks with the G77 on the need for developing country actions.”<sup>72</sup> The Kingdom of Saudi Arabia, one of the OPEC States, “seeks to obstruct negotiations in every possible way”, since this State’s economy is heavily reliant on fossil fuels and any binding climate deal with energy efficiency and alternative energy policies may negatively affect its economy.<sup>73</sup> All these have

---

<sup>66</sup> Dimitrov, *supra* note 65 at 77. See also Hoffmann, *supra* note 41 at 9.

<sup>67</sup> See World Bank Data 2010 – 2014 on CO<sub>2</sub> emissions at World Bank, “CO<sub>2</sub> emissions (kt)”, online: World Bank <data.worldbank.org/indicator/EN.ATM.CO2E.KT/countries>.

<sup>68</sup> See World Bank Data 2010 – 2014 on CO<sub>2</sub> emissions per capita at World Bank, “CO<sub>2</sub> emissions (metric tons per capita)”, online: World Bank <data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries>.

<sup>69</sup> See Marsden, *supra* note 31 at 81.

<sup>70</sup> See also *ibid* at 81ff. When asked how India’s ambition to improve the living standard of its citizens, which will match that of the US, reconcile with the world’s need to reduce emissions at the UNFCCC climate talks in Bonn in March 2009, Shyam Saran, India’s lead negotiator, replied:

“You cannot say that people in India, in developing countries, should not have aspirations for a higher standard of living. So you cannot say, ‘You stay where you are because you are a latecomer and we get to stay where we are because we have had a higher standard of living for the last so many years.’ That is simply not politically salable.”

*Ibid* at 81.

<sup>71</sup> Ghosh & Woods, *supra* note 51 at 454–55 (these developing States “do not wish to become ‘rule-takers’ in yet another sphere of global politics which leaves them vulnerable to rules, monitoring, and enforcement which they see as having asymmetric impact to their disadvantage”).

<sup>72</sup> Dimitrov, *supra* note 65 at 77.

<sup>73</sup> *Ibid*.

resulted in “stalemate” which, “from a political economy perspective, [is] not a very surprising one”.<sup>74</sup>

At ICAO, it can be observed that the Saudis are employing their old negotiating strategy of impeding progress on conclusion of a global market-based measure for international civil aviation. For example, Saudi Arabia is one of the two States (the other being the Russian Federation) that do not believe that market-based measures can effectively reduce emissions from aviation.<sup>75</sup> Particularly, Saudi Arabia urged to focus “on more effective measures, other than the market-based ones, to reduce emissions.”<sup>76</sup> Saudi Arabia is one of the twelve States that proposed that feasibility and practicability of any global market-based measure for international civil aviation has to be determined not only by ICAO but also by States.<sup>77</sup> ICAO performed quantitative and qualitative assessment of three policy options for a global market-based measure for international civil aviation.<sup>78</sup> The overall results of the assessment demonstrated that these options were cost-effective and technically feasible, would have only marginal impacts on future growth, and could contribute to achieving ICAO’s environmental goals.<sup>79</sup> The proposal of those twelve States implies that they were not content with the outcome of the ICAO report. The Kingdom of Saudi Arabia further proposed that the ICAO Secretariat should undertake further study to evaluate

---

<sup>74</sup> Hoffmann, *supra* note 41 at 10.

<sup>75</sup> Kingdom of Saudi Arabia, *Expectations and Desirable Objectives of the 38th Session of the Assembly relating to International Aviation and Climate Change — Perspective of the Kingdom of Saudi Arabia*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 176, Doc A38-WP/176/Ex/67 (20 August 2013) at 4, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp176\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp176_en.pdf)> [Kingdom of Saudi Arabia, *Expectations*]; Russian Federation, *Market-Based Measures as the Factor of an Increase of Greenhouse Gas Emissions in the Sector of International Civil Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 250, Doc A38-WP/250/Ex/83 (20 August 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp250\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp250_en.pdf)>; Russian Federation, *Statement from the Delegation of the Russian Federation: Re: Report on Agenda Item 17 for the 38th ICAO Assembly (Climate Change section)*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Russia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Russia_en.pdf)>.

<sup>76</sup> Kingdom of Saudi Arabia, *Expectations*, *supra* note 75 at 4.

<sup>77</sup> See Argentina et al, *Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 424, Doc A38-WP/424/Ex/139 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp424\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp424_en.pdf)>; Argentina et al, *Proposed Amendments for the Draft Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 432, Doc A38-WP/432/Ex/144 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp432\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp432_en.pdf)>. These twelve States are: Argentina, Brazil, China, Cuba, Guatemala, India, the Islamic Republic of Iran, Pakistan, Peru, the Russian Federation, Saudi Arabia, and South Africa.

<sup>78</sup> See ICAO, *Report of the Assessment of Market-based Measures*, 2013, 1st ed, ICAO Doc 10018 (2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/10018\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/10018_en.pdf)>.

<sup>79</sup> See *ibid.*

the “economic impact of market-based measures on the developing and remote States”.<sup>80</sup> Worth mentioning is the fact that the US had for years worked through the Saudis to impede progress in climate change talks.<sup>81</sup> We do not know for sure whether the US is playing the same strategy at ICAO to hinder progress.

As noted, developing States do not intend to commit to reduce their emissions in order to improve the living standard of their own citizens, since, among other things, there still exists significant difference between developed and developing States in terms of per capita emissions. In response, it may be argued that the developed world is not responsible for the poor living standard prevailing in the developing world. With respect to India, it can be contended that the failure of the State to educate its people, restrain its population growth, and ensure good governance is the reason behind the prevailing poor living standard for which the developed world cannot be held responsible.<sup>82</sup> These reasons equally apply to China.<sup>83</sup> Although developed States are not responsible for these failures of developing States, the former cannot just say to the latter “sorry, you are too late.”<sup>84</sup> However, while developed States are historically responsible for the current level of greenhouse gas concentrations in the atmosphere,<sup>85</sup> developing States are going to be responsible in the future. This is because it is highly likely that developing States would contribute more than the developed ones to the future level of such concentrations.<sup>86</sup> In such a circumstance, these developing States should not deny their future responsibility.<sup>87</sup>

Every State seems and desires to be a free rider in order to advance their short-term self-interests,<sup>88</sup> but does not want to allow other States to become free riders. They all suffer from

---

<sup>80</sup> Kingdom of Saudi Arabia, *Expectations*, *supra* note 75 at 4.

<sup>81</sup> See Marsden, *supra* note 31 at 25.

<sup>82</sup> See *ibid* at 82.

<sup>83</sup> See *ibid* (specifically, “China’s six decades of murderous Communist Party rule...froze that nation in poverty”).

<sup>84</sup> *Ibid* at 83.

<sup>85</sup> There exists widespread debate on the issue of whether or not developed States should accept their historical responsibility and, consequently, should be the first to restrain their emissions. See Stephen M Gardiner, “Climate Justice” in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 309 at 314–15; Ottmar Edenhofer et al, “The Atmosphere as a Global Commons – Challenges for International Cooperation and Governance”, Discussion Paper 13-58, The Harvard Project on Climate Agreements (August 2013) at 12, online: Harvard University Belfer Center for Science and International Affairs

<belfercenter.ksg.harvard.edu/publication/23364/atmosphere\_as\_a\_global\_commonschallenges\_for\_international\_cooperation\_and\_governance.html?breadcrumb=%2Fproject%2F56%2Fharvard\_project\_on\_climate\_agreements%3Fgroupby%3D0%26parent\_id%3D%26page\_id%3D211%26filter%3D2013> [Edenhofer et al, “The Atmosphere”].

<sup>86</sup> See also Hoffmann, *supra* note 41 at 6.

<sup>87</sup> See also Kartha, *supra* note 63 at 514.

<sup>88</sup> Harris, *supra* note 22 at 20, terms this problem as “the cancer of Westphalia”. He, *ibid*, asserts that “the Westphalian international system, which encourages nations to fight for their narrow, short-term perceived interests

prisoner's dilemma when it comes to addressing hazardous emissions.<sup>89</sup> States are reluctant to consider the environmental, social, and economic impacts of climate change and global warming on others.<sup>90</sup> A useful negotiating strategy to persuade others in any negotiation is to take into account others' interests while formulating own argumentation and to accommodate such interests in the argumentation.<sup>91</sup> Nevertheless, States' argumentation usually takes into account, and accommodates, their own interest. The consequence is unfettered growth of emissions that pollute the global atmospheric commons, something akin to Hardin's parable of a tragedy of the commons.<sup>92</sup> The IPCC fifth assessment report asserts that "climate change is a case of 'the tragedy of the commons'".<sup>93</sup> Thus, Professor Harris writes:

Climate change is not just unfortunate; it is a human-induced tragedy. What makes climate change especially tragic is that nobody intended it to be this way. It is a problem caused by people and industries and nations working hard to advance economically. The problem lies in the convenient but pernicious reality that everyone is free to use the global atmosphere as a dumping ground. In practice, this means that everyone is free to pollute the atmosphere, and we have done so with abandon for hundreds of years.<sup>94</sup>

It is true that no State possesses sovereignty over the atmosphere and, hence, the global

---

and makes truly effective international cooperation on climate change extraordinarily difficult". See also Helm, *supra* note 14 at 19.

<sup>89</sup> Helm, *supra* note 14 at 32, states that "[a]t the core is the prisoner's dilemma – it is in the interests of each party that the others reduce emissions, rather than themselves. That way, it is possible to gain the benefits of others' actions without bearing the costs oneself." To learn more about prisoner's dilemma, see Robert M Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 1984); Avinash Dixit & Barry Nalebuff, "Prisoners' Dilemma" in David R Henderson, ed, *Concise Encyclopedia of Economics*, 2nd ed (Indianapolis, Ind: Liberty Fund, 2008), online: Library of Economics and Liberty <[www.econlib.org/library/Enc/PrisonersDilemma.html](http://www.econlib.org/library/Enc/PrisonersDilemma.html)>; Online: The Prisoner's Dilemma <[www.prisoners-dilemma.com/](http://www.prisoners-dilemma.com/)>.

<sup>90</sup> Edenhofer et al, "The Atmosphere", *supra* note 85 at 20, state that "[t]he magnitude of people's willingness to take the fate of others into account in their decisions is an exogenous assumption in most economic analyses. It is usually assumed that this willingness is zero, i.e. agents base their decisions on pure self-interest."

<sup>91</sup> Dimitrov, *supra* note 65 at 72, argues that "[e]ffective argumentation focuses on the interests of other countries. Shrewd negotiators formulate their own argumentation with a view to accommodating the interests of their target audience."

<sup>92</sup> To learn about Hardin's parable, see Garrett Hardin, "The Tragedy of the Commons" (1968) 162:3859 *Science* 1243. It should be noted that Hardin resurrected the discussion of the problem of the "social trap" by William Forster Lloyd. See Marsden, *supra* note 31 at 162–63. To learn about the problem of the "social trap", see WF Lloyd, *Two Lectures On the Checks to Population, delivered before the University of Oxford, in Michaelmas Term 1832* (Oxford: S Collingwood, 1833).

<sup>93</sup> Charles Kolstad et al, "Social, Economic, and Ethical Concepts and Methods" in Ottmar Edenhofer et al, eds, *Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014) 207 at 211.

<sup>94</sup> Harris, *supra* note 22 at 4.

atmosphere can be labelled as a global commons.<sup>95</sup> Since Roman times, “the gaseous content of the atmosphere has been categorized as one of the legal commons”.<sup>96</sup> The global atmosphere satisfies the “descriptive criterion of a *common pool resource* as exclusion from usage is costly and usage of sink capacity is subtractive”.<sup>97</sup> Nonetheless, there is no common property regime in place for the atmosphere to govern it as a commons,<sup>98</sup> although States have acknowledged that climate change and its adverse effects are a common concern of humankind.<sup>99</sup> The International Law Commission [ILC] has suggested that the protection of the atmosphere should be considered a common concern of humankind.<sup>100</sup> Nonetheless, there does not exist any legal definition of the term “atmosphere”,<sup>101</sup> and, in practice, the atmosphere is treated as *res nullius* “with open access to anyone wishing to deposit carbon or other” greenhouse gases.<sup>102</sup> This follows the common argument, mainly by the realists in the international relations discipline, that, “in pursuit of self-interest in a global structure of sovereignty, [States] will destroy the commons (open access resources) unless radical constraints are put on” their authority.<sup>103</sup> In this respect, Hardin’s parable “captures much of the logic of scholars who see the sovereign state system as the core cause of the looming (or current) global ecological crisis.”<sup>104</sup>

---

<sup>95</sup> See John Vogler, “Studying the Global Commons: Governance without Politics?” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 172 at 172 [Vogler, “Studying”].

<sup>96</sup> International Law Commission, *First Report on the Protection of the Atmosphere*, UNGAOR, 2014, UN Doc A/CN.4/667 at 12 [ILC, *First Report*]. Under Sharia law, importance is placed on “the air” as the element indispensable “for the perpetuation and preservation of life”. One of the authoritative studies on sharia law states that air is “no less important than water”, and “[s]ince the atmosphere performs all these biological and social functions,” the conservation of air, “pure and unpolluted, is an essential aspect of the conservation of life itself which is one of the fundamental objectives of Islamic law”. *Ibid*.

<sup>97</sup> Edenhofer et al, “The Atmosphere”, *supra* note 85 at 8.

<sup>98</sup> See *ibid*. Malta attempted at the UN General Assembly in 1988 “to have the global atmosphere declared part of the common heritage of mankind”. However, this was unsuccessful. ILC, *First Report*, *supra* note 96 at 56. The International Law Commission, *ibid* [footnote omitted], states:

Since “common heritage” implies that a resource must be exploited and conserved for the benefit of mankind as a whole, such designation would usually require a far-reaching institutional apparatus to control the allocation of exploitation rights and benefits. If the atmosphere were treated as part of the common heritage of mankind, it would, in effect, place atmospheric problems under collective management – something widely considered premature.

<sup>99</sup> See UNFCCC, *supra* note 5, Preamble.

<sup>100</sup> See ILC, *First Report*, *supra* note 96 at 56–57.

<sup>101</sup> See *ibid* at 46–47. The International Law Commission, *ibid* at 47, has proposed the following definition:

“Atmosphere” means the layer of gases surrounding the earth in the troposphere and the stratosphere, within which the transport and dispersion of airborne substances occurs.

<sup>102</sup> Edenhofer et al, “The Atmosphere”, *supra* note 85 at 8.

<sup>103</sup> Peter Dauvergne, “Research Trends in Global Environmental Politics” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 3 at 8 [Dauvergne, “Research”].

<sup>104</sup> *Ibid* [footnote omitted]. It should be noted that Hardin’s parable is not perfect. The logic and accuracy of the parable of a tragedy of the commons are questioned by many “social scientists, notably Nobel Laureate Elinor

States possess sovereign right to exploit their own resources. However, this sovereign right is not unqualified. States should not forget the established customary international law principle according to which States have a sovereign right to exploit their own resources and simultaneous responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or *of areas beyond the limits of national jurisdiction*.<sup>105</sup> The *Trail Smelter* arbitration<sup>106</sup> gave birth to this established principle.<sup>107</sup> This principle is recognized under Principle 21 of the *Stockholm Declaration* and Principle 2 of the *Rio Declaration*,<sup>108</sup> and “already forms the basis for”<sup>109</sup> the *Long-Range Transboundary Air Pollution Convention [LRTAP]*,<sup>110</sup> the *Vienna Convention*,<sup>111</sup> and the *UNFCCC*.<sup>112</sup> Environmental treaties preceding the *Stockholm Declaration* also contain provision(s) that provides for such State obligation toward other States,<sup>113</sup> and a good number of treaties post-*Stockholm Declaration* provide the same.<sup>114</sup> In the *Corfu*

---

Ostrom,...arguing that there are numerous cases of communities “managing” common-pool resources in ways that contradict Hardin’s tragedy.” *Ibid* [footnote omitted]. See also Joanna Burger & Michael Gochfeld, “The Tragedy of the Commons 30 Years Later” (1998) 40:10 *Environment: Science & Policy for Sustainable Development* 4 (Taylor & Francis). A substantial amount of research suggests that “the “real” world of ecological management is far more complex than Hardin’s portrayal, with diverse policies and intricate governance structures”. Dauvergne, “Research”, *supra* note 103 at 8–9. See also Vogler, “Studying”, *supra* note 95 at 172ff.

<sup>105</sup> See also Phoebe N Okowa, *State Responsibility for Transboundary Air Pollution in International Law* (New York: Oxford University Press, 2000) at 65ff.

<sup>106</sup> *Trail Smelter Arbitration (United States v Canada)* (1938), 3 RIAA 1905, reprinted in 33 AJIL 182 (Arbitrators: Charles Warren, Robert AE Greenshields, Jan Frans Hostie).

<sup>107</sup> See e.g. “Report of the Commission to the General Assembly on the work of its fifty-third session” (UN Doc A/56/10) in *Yearbook of the International Law Commission 2001*, vol 2, part 2 (New York: UN, 2007) at 148 (UNDOC. A/CN.4/SER.A/2001/Add.1 (Part 2)); Michel Adam, “ICAO Assembly’s Resolution on Climate Change: A ‘Historic’ Agreement?” (2011) 36:1 *Air & Space L* 23 at 28 (Kluwer Law Online).

<sup>108</sup> *Declaration of the United Nations Conference on the Human Environment*, 16 June 1972, 11 ILM 1416, Principle 21, online: UNEP

<[www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503](http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503)>; *Rio Declaration on Environment and Development*, UN Doc A/CONF.151/5/Rev.1 (1992), 31 ILM 874, Principle 2, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163)>.

<sup>109</sup> Patricia Birnie, Alan Boyle & Catherine Redgwell, *International Law and the Environment*, 3rd ed (New York: Oxford University Press, 2009) at 339.

<sup>110</sup> *Convention on Long-Range Transboundary Air Pollution*, 13 November 1979, 1302 UNTS 217, Can TS 1983 No 34 (entered into force 16 March 1983) [*LRTAP*].

<sup>111</sup> *Vienna Convention for the Protection of the Ozone Layer*, 22 March 1985, 1513 UNTS 293, Can TS 1988 No 23 (entered into force 22 September 1988) [*Vienna Convention*].

<sup>112</sup> *UNFCCC*, *supra* note 5.

<sup>113</sup> See e.g. *International Plant Protection Convention*, 6 December 1951, 150 UNTS 67, Can TS 1953 No 16, Preamble; *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, 5 August 1963, 480 UNTS 43, art 1(1)(b), Can TS 1964 No 1; *African Convention on the Conservation of Nature and Natural Resources*, 15 September 1968, 1001 UNTS 3, art 16(1)(b). See also Philippe Sands et al, *Principles of International Environmental Law*, 3rd ed (New York: Cambridge University Press, 2012) at 197–98.

<sup>114</sup> See e.g. *Treaty for Amazonian Co-operation*, 3 July 1978, 1202 UNTS 51, art 4; *Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific*, 12 November 1981, IELMT 981:85, art 3(5); *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3, art 193, UKTS 1999 No 81. See also Sands et al, *supra* note 113 at 198–99.

*Channel Case*, the International Court of Justice [ICJ] stated that “every State’s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States” is a “general and well-recognized” principle.<sup>115</sup> In the *Legality of the Threat or Use of Nuclear Weapons Case*, the ICJ opined that “[t]he existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment.”<sup>116</sup>

As mentioned, the atmosphere is not, and cannot be, owned by any single State. Nonetheless, polluting the atmosphere through national greenhouse gas emissions certainly causes damage to the environment of other States or of areas beyond the limits of national jurisdiction, which include the global atmosphere. It may be argued that it is impossible to exactly determine how much damage is caused to the environment of any given State, say Maldives, by greenhouse gas emissions of another State, say the US.<sup>117</sup> The ILC has raised a similar concern.<sup>118</sup> This “impossibility theory” provides an escape route for States to evade their responsibility not to cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. Concerning pollution of the global atmosphere, one may argue that greenhouse gas emissions do not cause damage but *merely* increase the concentrations of greenhouse gases in the atmosphere. This latter argument can be countered by arguing that States would not have concluded treaties related to atmospheric pollution, namely, the *LRTAP*,<sup>119</sup> the *Vienna Convention*,<sup>120</sup> and the *UNFCCC*,<sup>121</sup> unless they had considered that altering the composition of the atmosphere through pollution of the atmosphere is an environmental damage caused to the global atmosphere.<sup>122</sup> Since

---

<sup>115</sup> *The Corfu Channel Case*, [1949] ICJ Rep 4 at 22.

<sup>116</sup> *Legality of the Threat or Use of Nuclear Weapons Case*, Advisory Opinion, [1996] ICJ Rep 226 at 241–42 [emphasis added]. See also *Award in the Arbitration regarding the Iron Rhine Railway (Belgium v Netherlands)* (2005), ICGJ 373 at para 222 (Permanent Court of Arbitration).

<sup>117</sup> *LRTAP*, *supra* note 110, art 1(b) [emphasis added], defines the term “long-range transboundary air pollution” as: [A]ir pollution whose physical origin is situated wholly or in part within the area under the national jurisdiction of one State and which has adverse effects in the area under the jurisdiction of another State at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources.

<sup>118</sup> The ILC, *First Report*, *supra* note 96 at 35, notes:

Questions remain as to whether the...principle [of *sic utere tuo ut alienum non laedas* (use your own property so as not to injure that of another)] can be extended to the case of long-distance (transcontinental) air pollution, where the causal link is difficult to prove; and as to whether it can be extended to global atmospheric problems such as ozone depletion and climate change.

<sup>119</sup> *LRTAP*, *supra* note 110.

<sup>120</sup> *Vienna Convention*, *supra* note 111.

<sup>121</sup> *UNFCCC*, *supra* note 5.

<sup>122</sup> See e.g. Xue Hanqin, *Transboundary Damage in International Law* (New York: Cambridge University Press, 2003) ch 6.



the issue of “damage” is beyond the scope of this chapter, the issue will not be further explored here. It should be noted that the ILC is currently working on the development of draft articles on the protection of the atmosphere to provide useful guidance on the issue of protection of the atmosphere.<sup>123</sup>

Nonetheless, it will be unfair to blame all States for both the growing atmospheric pollution and slow progress of climate change negotiation. From the developed world, the EU and its twenty-eight Member States are considered the global leader on climate policy.<sup>124</sup> The EU has a target of reducing its greenhouse gas emissions to at least 20 percent below 1990 levels by 2020,<sup>125</sup> and, recently, the Union has set a new target of reducing its domestic greenhouse gas emissions by at least 40 percent below the 1990 levels by 2030.<sup>126</sup> The EU has the largest international market-based measure, known as the EU Emissions Trading System [EU ETS], to reduce its anthropogenic emissions of greenhouse gases that accelerate climate change and global warming.<sup>127</sup> The Union “played a leading role in driving negotiations forward”<sup>128</sup> with respect to the negotiations of the

---

<sup>123</sup> In 2013, the ILC at its 65<sup>th</sup> Session decided to include the topic “Protection of the atmosphere” in its programme of work. See International Law Commission, “Sixty-fifth Session (2013)”, online: International Law Commission <[legal.un.org/ilc/sessions/65/](http://legal.un.org/ilc/sessions/65/)>. The ILC, *First Report*, *supra* note 96 at 8, notes that, although the draft articles on prevention of transboundary harm and the draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities adopted by the Commission in 2001 and 2006, respectively, “contain important provisions potentially applicable to atmospheric damage[,]... they do not adequately address the protection of the atmosphere.”

<sup>124</sup> See generally ch 5, *above*; Dimitrov, *supra* note 65 at 75–76; Hoffmann, *supra* note 41 (“[t]he Europeans, mostly convinced of the urgency of the problem (and beneficiaries of internal diversity of emissions profiles that would make reductions easier to come by within the EU)...have consistently pushed for significant emissions reductions” at 9).

<sup>125</sup> See European Commission, “2020 climate & energy package”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/strategies/2020/index\\_en.htm](http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm)>.

<sup>126</sup> See European Commission, “2030 climate & energy framework”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/strategies/2030/index\\_en.htm](http://ec.europa.eu/clima/policies/strategies/2030/index_en.htm)>.

<sup>127</sup> See European Commission, “The EU Emissions Trading System (EU ETS)” (October 2013), online: European Commission <[ec.europa.eu/clima/publications/docs/factsheet\\_ets\\_en.pdf](http://ec.europa.eu/clima/publications/docs/factsheet_ets_en.pdf)>. The EU ETS is the EU’s “key tool” for reducing greenhouse gas emissions from industrial sources in a cost-effective and economically efficient manner. Launched on January 1, 2005, the EU ETS is the first and the largest international market-based measure: it covers more than 11,000 power stations and industrial plants in 31 Member States of the European Economic Area, as well as airlines. European Commission, “The EU Emissions Trading System (EU ETS): Policy”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm)>. Airlines from non-EU States have been included in this scheme since January 2012. See EC, *Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, [2009] OJ, L 8/3 [Directive 2008/101].

<sup>128</sup> Katelyn E Ciolino, “Up in the Air: The Conflict Surrounding the European Union’s Aviation Directive and The Implications of a Judicial Resolution” (2012–2013) 38:3 Brook J Intl L 1151 at 1186 (HeinOnline). See also Charles F Parker & Christer Karlsson, “Climate Change and the European Union’s Leadership Moment: An Inconvenient Truth?” (2010) 48:4 J Common Market Studies 923 (Wiley) (“[t]he EU has attempted to be the global standard

*Kyoto Protocol*, mainly concerning the Protocol's second commitment period, and the *Copenhagen Accord*.<sup>129</sup> Nonetheless, it has yet to succeed in exporting its environmental values to non-EU States.<sup>130</sup> So far, the success of the EU is limited to “getting international actors to the negotiating table”,<sup>131</sup> which cannot be considered a negligible achievement. Like the EU, the low-lying small island States from the developing world want global “action as strong and swift as possible”.<sup>132</sup> These States are extremely vulnerable to sea-level rise,<sup>133</sup> and, by reason of their concern over their own existence, they want faster progress and stronger commitment.<sup>134</sup>

### **6.2.7 The Arctic Five**

The effects of climate change and global warming will be felt everywhere.<sup>135</sup> However, such effects will not be equally felt by every State. It should be noted that some developing States not only risk non-existence but also lack the means to shield themselves from such adverse effects.<sup>136</sup> Additionally, their contribution to climate change and global warming is negligible

---

bearer on climate change by laying out bold unilateral goals, vigorously supporting the Kyoto Protocol and pushing hard for an ambitious post-2012 successor agreement” at 924).

<sup>129</sup> *Copenhagen Accord*, *supra* note 17.

<sup>130</sup> See Louise Van Schaik & Simon Schunz, “Explaining EU Activism and Impact in Global Climate Politics: Is the Union a Norm- or Interest-Driven Actor?” (2012) 50:1 J Common Market Studies 169 (Wiley) (“‘Europe’s attainment is normative rather than empirical’ in the domain of climate change: the EU’s predominantly norm-driven approach yielded little practical impact” at 183); Ciolino, *supra* note 128 at 1186; Elaine Fahey & Ester Herlin-Karnell, “EU Law qua Global Governance Law? Deciphering Regulatory and Constitutional Competence Between EU Environmental Law and Global Governance” (2012) 13:11 German LJ 1147 (HeinOnline) (“[t]he promotion of EU external values is subject to variable – even weak – enforcement, and a lack of global consensus” at 1148 [footnote omitted]). One of the reasons for this failure to export its environmental values may be that the EU Member States have yet to meet their obligations under the *Kyoto Protocol* thereby undermining the credibility and effectiveness of EU’s climate leadership. See Parker & Karlsson, *supra* note 128. For a detailed discussion, see Schaik & Schunz, *ibid* at 178–82.

<sup>131</sup> Ciolino, *supra* note 128 at 1186.

<sup>132</sup> Dimitrov, *supra* note 65 at 78.

<sup>133</sup> Regarding impacts of climate change induced sea-level rise on low-lying island States, see Mary-Elena Carr et al, “Sea Level Rise in a Changing Climate: What Do We Know?” in Michael B Gerrard & Gregory E Wannier, eds, *Threatened Island Nations: Legal Implications of Rising Seas and a Changing Climate* (New York: Cambridge University Press, 2013) 15.

<sup>134</sup> See e.g. Hoffmann, *supra* note 41 (“small island nations, facing an existential threat, have consistently pushed for significant emissions reductions” at 9).

<sup>135</sup> See e.g. IPCC, “Summary for Policymakers” in Christopher B Field et al, eds, *Climate Change 2014: Impacts, Adaptation, and Vulnerability: Part A: Global and Sectoral Aspects: Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014) 1.

<sup>136</sup> Hoffmann, *supra* note 41 at 7, writes: “Climate changes will be felt locally, regionally, nationally, and internationally, but with significant variation, and many of the poorest countries are likely to suffer the most dramatic consequences. In addition, the capacity to respond to climate changes also varies significantly. This produces wide disparity in the urgency felt about the problem.”

compared to the contribution from large emitting States. In such circumstances, the actions of large emitting States, both developed and developing, to develop their economies, and their concurrent inactions to drive climate change negotiations forward are frustrating. In this respect, the actions of one group of developed States outside the climate change negotiations deserve brief discussion. This is the five States of the Arctic Five or Arctic G5 who are members of the Arctic Council, “a high level intergovernmental forum to provide a means for promoting cooperation, coordination and interaction among the Arctic States”.<sup>137</sup>

The Member States of the Arctic Council are: Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, the Russian Federation, Sweden, and the US.<sup>138</sup> However, the Arctic Five States are: Canada, the Russian Federation, the US, Norway, and Denmark.<sup>139</sup> They differentiate themselves from the Arctic Council for they “officially possess territories in the Arctic Ocean where natural resources can be found”.<sup>140</sup> The Arctic Council seems to be concerned with the issues of sustainable development and environmental protection in the Arctic.<sup>141</sup> However, the Arctic Five is more concerned with territorial rights over their continental shelves, since that will facilitate exploration and extraction of natural resources, mainly oil and gas.<sup>142</sup> A 2008 US Geological Survey assessment estimated that the resources of the entire area north of the Arctic Circle account for “about 22 percent of the undiscovered, technically recoverable resources in the world.”<sup>143</sup> More specifically, it was estimated that the “Arctic accounts for about 13 percent of the undiscovered oil, 30 percent of the undiscovered natural gas, and 20 percent of the undiscovered natural gas liquids in the world.”<sup>144</sup> This estimate coupled with increasing decline of glaciers and sea-ice, which is opening up the Arctic waters for new shipping routes and for expedient natural resource exploration, triggered actions from the Arctic Five to

---

<sup>137</sup> Arctic Council, “About the Arctic Council” (7 April 2011), online: Arctic Council <[www.arctic-council.org/index.php/en/about-us/arctic-council/about-arctic-council](http://www.arctic-council.org/index.php/en/about-us/arctic-council/about-arctic-council)> [Arctic Council, “About”].

<sup>138</sup> See *ibid.*

<sup>139</sup> See e.g. Nikita Sorokin, ““The Arctic five” preserve their monopoly”, *The Voice of Russia* (19 March 2013), online: Sputnik <[sputniknews.com/voiceofrussia/2013\\_03\\_19/The-Arctic-five-preserve-their-monopoly/](http://sputniknews.com/voiceofrussia/2013_03_19/The-Arctic-five-preserve-their-monopoly/)>.

<sup>140</sup> *Ibid.* See also Marsden, *supra* note 31, ch 6.

<sup>141</sup> See Arctic Council, “About”, *supra* note 137.

<sup>142</sup> See Scott G Borgerson, “Arctic Meltdown: The Economic and Security Implications of Global Warming”, *Foreign Affairs* 87:2 (March/April 2008) 63 (HeinOnline); Marsden, *supra* note 31, ch 6.

<sup>143</sup> US Department of the Interior, US Geological Survey, News Release, “90 Billion Barrels of Oil and 1,670 Trillion Cubic Feet of Natural Gas Assessed in the Arctic” (23 July 2008), online: US Geological Survey <[www.usgs.gov/newsroom/article.asp?ID=1980](http://www.usgs.gov/newsroom/article.asp?ID=1980)>.

<sup>144</sup> *Ibid.*

preserve and establish their sovereign rights and jurisdiction over the Arctic region.<sup>145</sup> Worth mentioning is the fact that four members of the Arctic Five, namely, the US, Canada, the Russian Federation, and Norway, are major fossil fuel producers.<sup>146</sup> Thus, it is apparent that climate change and global warming for the Arctic Five are “an opportunity rather than a tragedy”,<sup>147</sup> and they are leaving no stone unturned to snatch that opportunity. The Arctic Five is reluctant to cease the exploration and exploitation of natural resources, although such activities have the potential to intensifying the effects of climate change.<sup>148</sup>

The four major fossil fuel producers of the Arctic Five are members of the Umbrella Group in climate change negotiations, the priority of which is “maintaining strong economic growth”,<sup>149</sup> and which “oppose the continuation of the Kyoto Protocol” in favor of a “single global treaty that ensures actions by all major emitters”.<sup>150</sup> The present and predicted future effects of climate change and global warming on these States of the Umbrella Group are significant as well and they are well aware of this fact.<sup>151</sup> Yet, these States insist on actions by all major emitters that has the effect of halting the progress of the climate change negotiation since, as noted earlier, the four BASIC States strongly oppose taking any such actions, which they perceive to affect their national economic

---

<sup>145</sup> See e.g. Borgerson, *supra* note 142; Kiley Kroh & Howard Marano, “Adding Fuel to the Fire: The Climate Consequences of Arctic Ocean Drilling”, *Center for American Progress* (21 March 2013), online: Center for American Progress <[cdn.americanprogress.org/wp-content/uploads/2013/03/ArcticDrillingBrief-2.pdf](http://cdn.americanprogress.org/wp-content/uploads/2013/03/ArcticDrillingBrief-2.pdf)>; Marsden, *supra* note 31, ch 6.

<sup>146</sup> See Ed King, “Arctic Council decision leaves region open for oil and gas drilling”, *RTCC: Responding to Climate Change* (23 May 2013), online: RTCC <[www.rtcc.org/2013/05/15/arctic-council-decision-leaves-region-open-for-oil-and-gas-drilling/](http://www.rtcc.org/2013/05/15/arctic-council-decision-leaves-region-open-for-oil-and-gas-drilling/)>.

<sup>147</sup> Marsden, *supra* note 31 at 152. See also Helm, *supra* note 14 (“[s]ome countries – notably in the Arctic regions – may actually experience some gains from climate change” at 11).

<sup>148</sup> See Greenpeace, Briefing, “The Risks and Potential Impacts of Oil Exploration in the Arctic” (26 August 2010), online: Greenpeace

<[www.greenpeace.org/international/Global/international/publications/climate/2010/ArcticBriefingFINAL.pdf](http://www.greenpeace.org/international/Global/international/publications/climate/2010/ArcticBriefingFINAL.pdf)>;

Marsden, *supra* note 31, ch 7; King, *supra* note 146.

<sup>149</sup> Marsden, *supra* note 31 at 242.

<sup>150</sup> Dimitrov, *supra* note 65 at 76. Japan already indicated that “it does not have any intention to be under obligation of the second commitment period of the Kyoto Protocol after 2012.” Likewise, the Russian Federation “indicated that it does not intend to assume a quantitative emission limitation or reduction commitment for the second commitment period.” See *Doha amendment*, *supra* note 20.

<sup>151</sup> See e.g. FJ Warren & DS Lemmen, eds, *Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation* (Ottawa: Government of Canada, 2014); Jerry M Melillo, Terese (TC) Richmond & Gary W Yohe, eds, *Climate Change Impacts in the United States: The Third National Climate Assessment: U.S. Global Change Research Program* (Washington, DC: US Government Printing Office, 2014); Penny Whetton et al, eds, *Climate Change in Australia: Projections for Australia’s Natural Resource Management Regions: Technical Report* (CSIRO & Bureau of Meteorology, Department of the Environment, Australian Government, 2015); NZ Ministry for the Environment, “Climate change impacts in New Zealand”, online: New Zealand Ministry for the Environment <[www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/climate-change-impacts](http://www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/climate-change-impacts)>.

development.<sup>152</sup> One may speculate that the Umbrella group is intentionally playing this negotiating strategy to hamper progress in favor of their fossil fuel industry, since they already know that such insistence would be robustly opposed by the BASIC States. Professor Hoffmann argues that our traditional way of defining the problem of climate change “as one where everyone emits greenhouse gases and we have to measurably restrict those in an enforceable way to solve the problem” has led to the impasse of the climate change negotiations, since this definition “inherently means distributing something costly”, namely, emissions reductions.<sup>153</sup> It can be hoped that the future climate change agreement, which is expected to be signed at the end of 2015 in Paris, will mitigate this difficulty of distributing emissions reductions commitments through the introduction of the new concept of intended nationally determined contribution.<sup>154</sup> Under this new concept, Parties will submit their intended nationally determined contributions that will include, *inter alia*, a clear statement of emissions mitigation.<sup>155</sup>

### **6.2.8 Contribution of citizens**

It is not accurate to blame States only. The citizens of these States, who are the consumers, are equally responsible. Emissions occur to meet consumers’ needs and consumers also pollute through consumption.<sup>156</sup> People are addicted to modernity and “the growing pollution that comes from material consumption, energy use, and other aspects of modern lifestyles...are spreading

---

<sup>152</sup> Kartha, *supra* note 63 at 507, notes that developing world is “concerned that an inequitable climate regime will force a choice between development and climate protection. It is for this reason that developing countries remain unambiguous in their insistence that, as important as it is to deal with climate change, a solution cannot come at the expense of their right to development.”

<sup>153</sup> Hoffmann, *supra* note 41 at 10.

<sup>154</sup> To learn more about this concept, see UNFCCC, “Intended Nationally Determined Contributions (INDCs)”, online: UNFCCC <[unfccc.int/focus/indc\\_portal/items/8766.php](http://unfccc.int/focus/indc_portal/items/8766.php)>. In 2007, Bodansky and Diringier proposed a similar solution which they labelled “integrated multi-track approach”. See Daniel Bodansky & Elliot Diringier, “Towards An Integrated Multi-Track Climate Framework” (December 2007) prepared for the Pew Center on Global Climate Change (Pew Center on Global Climate Change, Arlington, Va), online: Pew Center on Global Climate Change <[www.c2es.org/docUploads/Multi-Track-Report.pdf](http://www.c2es.org/docUploads/Multi-Track-Report.pdf)>.

<sup>155</sup> See *Further advancing the Durban Platform*, UNFCCC COP Dec 1/CP.19, in UNFCCC, *Report of the Conference of the Parties on its nineteenth session, held in Warsaw from 11 to 23 November 2013. Addendum. Part two: Action taken by the Conference of the Parties at its nineteenth session*, UNFCCC Conference of the Parties, 19th Sess, Doc FCCC/CP/2013/10/Add.1 (2014) 3, online: UNFCCC <[unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf](http://unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf)>; *Lima Climate Action*, *supra* note 19. To view the latest draft negotiating text, see UNFCCC, *Negotiating text* (advance unedited version 12 February 2015), Work of the Contact Group on Item 3, Ad Hoc Working Group on the Durban Platform For Enhanced Action, 2nd Sess, Part 8 (2015), online: UNFCCC <[unfccc.int/files/bodies/awg/application/pdf/negotiating\\_text\\_12022015@2200.pdf](http://unfccc.int/files/bodies/awg/application/pdf/negotiating_text_12022015@2200.pdf)> (visited August 20, 2015) [*Paris Agreement: Negotiating text*].

<sup>156</sup> See Helm, *supra* note 14 at 20ff.

from the developed nations to the developing world as more people join the global middle class.”<sup>157</sup> People need to be concerned with climate change and global warming that will persuade them to alter their behavior and to put pressure on their governments to take effective action; otherwise, States will not feel any real pressure to change course. In the absence of such pressure, States are going to prolong the negotiation period, which will further deteriorate our climate system. Public concern over climate change and global warming is commencing to arise. Unfortunately, “climate change remains low on the public list of priorities worldwide”,<sup>158</sup> as “[p]eople often utilize simplified decision rules such as a preference for the status quo”.<sup>159</sup>

### **6.2.9 Predicted consequences of climate change and global warming**

According to the World Health Organization, climate change is “estimated to cause over 150,000 deaths annually”.<sup>160</sup> According to the same Organization, it is expected that climate change will cause approximately 250,000 additional deaths per year between 2030 and 2050, from malnutrition, malaria, diarrhea, and heat stress.<sup>161</sup> The IPCC fifth assessment report states:

Substantial emissions reductions over the next few decades can reduce climate risks in the 21st century and beyond, increase prospects for effective adaptation, reduce the costs and challenges of mitigation in the longer term and contribute to climate-resilient pathways for sustainable development.<sup>162</sup>

Earlier in 2007, the famous Stern Review concluded that we need to take strong action to cut emissions now, since climate change “could have very serious impacts on growth and development”.<sup>163</sup> However, such action does not need to “cap the aspirations for growth of rich or

---

<sup>157</sup> Harris, *supra* note 22 at 20.

<sup>158</sup> Kari Marie Norgaard, “Climate Denial: Emotion, Psychology, Culture, and Political Economy” in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 399 at 399.

<sup>159</sup> IPCC, “Summary for Policymakers” in Ottmar Edenhofer et al, eds, *Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014) 1 at 6.

<sup>160</sup> The Health and Environment Linkages Initiative (HELI), “Climate Change”, online: World Health Organization <[www.who.int/heli/risks/climate/climatechange/en/](http://www.who.int/heli/risks/climate/climatechange/en/)>.

<sup>161</sup> See World Health Organization, *Climate Change and Health*, Fact sheet No 266 (Reviewed August 2014), online: World Health Organization <[www.who.int/mediacentre/factsheets/fs266/en/](http://www.who.int/mediacentre/factsheets/fs266/en/)>.

<sup>162</sup> The Core Writing Team [Rajendra K Pachauri et al], Rajendra K Pachauri & Leo Meyer, eds, *Climate Change 2014: Synthesis Report: Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva: IPCC, 2015) at 17.

<sup>163</sup> “Summary of Conclusions” in Nicholas Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007) xv at xv [*Stern Review*].

poor countries”.<sup>164</sup> Later studies also support the conclusions of Stern Review. For example, a discussion paper produced under the Harvard Project on Climate Agreements concludes that, “if the adoption of climate policy is delayed until the year 2020 with all countries following their current business-as-usual emission pathways, global mitigation costs are projected to increase by at least half.”<sup>165</sup> There is an agreement among the scientists that “the world must take action now to change the nature of our economy and wean itself off fossil fuels so that decades or even a century in the future, our climate remains hospitable for the world’s great-grandchildren.”<sup>166</sup>

### **6.2.10 Capitalism**

Everybody, ranging from States to individuals, is concerned, nonetheless, with his or her short-term self-interest, which some authors consider the main environmental villain.<sup>167</sup> Scholars, who draw upon Marxism to study global environmental politics, argue that capitalism is

---

<sup>164</sup> *Ibid* at xvii. The conclusions of *Stern Review*, *ibid* at xv–xviii, are:

- There is still time to avoid the worst impacts of climate change, if we take strong action now.
- Climate change could have very serious impacts on growth and development.
- The costs of stabilizing the climate are significant but manageable; delay would be dangerous and much more costly.
- Action on climate change is required across all countries, and it need not cap the aspirations for growth of rich or poor countries.
- A range of options exists to cut emissions; strong, deliberate policy action is required to motivate their take up.
- Climate change demands an international response, based on a shared understanding of long-term goals and agreement on frameworks for action.

Unsurprisingly, Stern’s report has come under attack from other economists. See e.g. Helm, *supra* note 14. However, it appears from his book published in 2009 that Stern’s position has not changed. See Nicholas Stern, *The Global Deal: Climate Change and the Creation of a New Era of Progress and Prosperity*, 1st ed (New York: PublicAffairs, 2009). Furthermore, in a co-authored book chapter, Stern answers some of those criticisms. See Cameron Hepburn & Nicholas Stern, “The Global Deal on Climate Change” in Dieter Helm & Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009) 36. More recently, Stern publishes another article, Nicholas Stern, “Economic Development, Climate and Values: Making Policy” (2015) 282:1812 *Proceedings Royal Society B: Biological Sciences* 1 at 1, where he claims:

The latest research and results show that the case for avoiding the risks of dangerous climate change through the transition to low-carbon economic development and growth is still stronger than when the Stern Review was published. This is partly because of evidence that some of the impacts of climate change are happening more quickly than originally expected, and because of remarkable advances in technologies, such as solar power.

<sup>165</sup> Edenhofer et al, “The Atmosphere”, *supra* note 85 at 5–6.

<sup>166</sup> Hoffmann, *supra* note 41 at 7.

<sup>167</sup> Thus, Harris, *supra* note 22 at 2 [footnote omitted], asserts:

[F]undamentally, what ails climate politics is self-interestedness – selfishness of governments, selfishness of politicians, selfishness of businesses, selfishness of other special interests, and ultimately selfishness of individuals. Foremost may be the tendency of the international political and economic systems to perpetuate and even encourage narrowly selfish behavior of nations and other actors, and frequently to forget that human beings are at the root of climate change.

responsible for this attitude toward environment. At the heart of the broad tradition of Marxism is “the idea that humans’ experience is fundamentally shaped by the social organization of material production.”<sup>168</sup> Traditionally, Marxism has criticized “capitalism as a social arrangement for material production.”<sup>169</sup> Particularly, capitalists were criticized “for their free appropriation of natural resources, which broke the unity between man...and nature”.<sup>170</sup> To Marxism, capitalism is “inherently anti-ecological”.<sup>171</sup> Newell and Paterson, two Marxism scholars, argue that “the rise of contemporary forms of capitalism is closely connected to the large-scale exploitation and use of fossil fuels.”<sup>172</sup> According to the Marxist school of thought, “the process of capital accumulation necessarily reproduces and intensifies inequalities.”<sup>173</sup> Consequently, Paterson argues that the differences between developed and developing world in the climate change negotiations are the product of this “structural inequality in the political economy”.<sup>174</sup>

### **6.2.11 Conclusion: need for global governance**

It appears that capitalism is driving everybody, ranging from States to individuals, to follow his or her near-term self-interest. Since it is very difficult to reject capitalism altogether, which is “a deeply established and seemingly immutable economic system”,<sup>175</sup> several solutions have been suggested that do not discard but provide a new method of practicing capitalism. These solutions

---

<sup>168</sup> Hayley Stevenson, “Alternative Theories: Constructivism, Marxism and Critical Approaches” in Paul G Harris, ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014) 42 at 45.

<sup>169</sup> *Ibid.*

<sup>170</sup> *Ibid* at 46. See also Carolyn Merchant, *Ecology*, 2nd ed (Amherst, NY: Humanity Books, 2008) at 52–54.

<sup>171</sup> Stevenson, *supra* note 168 at 46. See also John Bellamy Foster, Brett Clark & Richard York, *The Ecological Rift: Capitalism’s War on the Earth* (New York: Monthly Review Press, 2010).

<sup>172</sup> Peter Newell & Matthew Paterson, *Climate Capitalism: Global Warming and the Transformation of the Global Economy* (New York: Cambridge University Press, 2010) at 11–12.

<sup>173</sup> Matthew Paterson, *Global Warming and Global Politics* (London, UK: Routledge, 1996) at 171.

<sup>174</sup> *Ibid* at 171–72.

<sup>175</sup> Stevenson, *supra* note 168 at 45.



include: sustainable development,<sup>176</sup> sustainable capitalism,<sup>177</sup> and climate capitalism.<sup>178</sup> These solutions can be more conveniently employed locally, or even nationally, than globally for there does not exist any single global order akin to a sovereign State that can dictate such course of action to States.<sup>179</sup> A single global order, e.g., a world government, is essential to deploy any of these solutions that will trump the developed-developing world polemics. Unfortunately, we do not, and cannot, have a world government since that will require the States to sacrifice their sovereignty, which is impossible in present circumstances and in the foreseeable future.<sup>180</sup> Therefore, we need to resort to global governance in climate change – climate change governance – that can facilitate deployment of these solutions. Market-based measures form part of these solutions, and an effective climate change governance can ensure effective implementation and efficiency of these measures.<sup>181</sup> As argued in Chapters 4 and 5, for international civil aviation, a temporary but mandatory, well-designed global market-based measure or unilateral market-based measures of the same model adopted by economically powerful States must be in place to reduce

---

<sup>176</sup> The term “sustainable development” played a central role in the United Nations appointed Brundtland Commission and in the Commission’s report. To view the report, see World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987). The term “has been prominent in discussions about environmental policy since the mid-1980s”. Susan Baker, *Sustainable Development* (New York: Routledge, 2006) at 6. Nagendra Singh, a former President of the International Court of Justice (ICJ), suggested that “sustainable development as an environmental principle was a peremptory norm in international law which no treaty or customary practice could breach”. Afshin Akhtarkhavari, *Global Governance of the Environment: Environmental Principles and Change in International Law and Politics* (Cheltenham, UK: Edward Elgar, 2010) at 3, n 3. See Nagendra Singh, “Sustainable Development as a Principle of International Law” in PJIM de Waart, Paul Peters & Erik Denters, eds, *International Law and Development* (Dordrecht: Martinus Nijhoff, 1988) 1. To learn about the history of the concept of sustainable development, see Rio+20: United Nations Conference on Sustainable Development, “The History of Sustainable Development in the United Nations”, online: Rio+20: United Nations Conference on Sustainable Development <[www.uncsd2012.org/history.html](http://www.uncsd2012.org/history.html)>.

<sup>177</sup> See John Ikerd, *Sustainable Capitalism: A Matter of Common Sense* (Bloomfield, Conn: Kumarian Press, 2005); Neil E Harrison, *Sustainable Capitalism and the Pursuit of Well-Being* (New York: Routledge, 2014); Generation Investment Management, *Sustainable Capitalism*, White Paper, v 1.1 (15 February 2012), online: Generation <[www.generationim.com/media/pdf-generation-sustainable-capitalism-v1.pdf](http://www.generationim.com/media/pdf-generation-sustainable-capitalism-v1.pdf)>.

<sup>178</sup> See Newell & Paterson, *supra* note 172; Lovins & Cohen, *supra* note 39. For a critic of climate capitalism, see Adrian Parr, *The Wrath of Capital: Neoliberalism and Climate Change Politics* (New York: Columbia University Press, 2013) ch 1.

<sup>179</sup> Falkner contends that “[i]n the absence of a central authority such as a world government, individual states are driven to pursue a narrowly defined, short-term, national interest that ignores the universal and long-term concerns of the global environment.” Robert Falkner, “The Nation-State, International Society, and the Global Environment” in Robert Falkner, ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013) 251 at 252.

<sup>180</sup> See e.g. Lawrence S Finkelstein, “What is Global Governance?” (1995) 1:3 *Global Governance* 367 (JSTOR); Arie M Kacowicz, “Global Governance, International Order, and World Order” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 686.

<sup>181</sup> *Contra* Angela Oels, “Rendering Climate Change Governable: From Biopower to Advanced Liberal Government?” (2005) 7:3 *J Environmental Policy & Planning* 185.

emissions from aviation. The following sections address the issue of climate change governance in international civil aviation with an emphasis on ICAO, the global forum of States for international civil aviation.<sup>182</sup>

### **6.3 Climate change governance in international civil aviation**

#### **6.3.1 Introduction**

Governance with respect to climate change and global warming is often referred to as climate change governance or climate governance.<sup>183</sup> Although climate change and global warming are global environmental issues, attempts have been made from different levels, in addition to the global level, to address these global phenomena. Initially, climate change was an obscure scientific topic. However, within less than three decades, the issue has developed into “a key item on the global public agenda.”<sup>184</sup> At present, there is strong agreement that climate change and global warming must be addressed “through the mitigation of greenhouse gas (GHG) emissions and...adaptation.”<sup>185</sup> However, as can be observed from the foregoing discussion, climate change governance at the global level is difficult for several reasons.<sup>186</sup> This is equally true for climate change governance in international civil aviation.<sup>187</sup>

Ghosh and Woods note that the challenge for climate change governance at the global level is twofold: “(i) to create, monitor, and enforce a [rules-based] regime to ensure emissions continue to reduce; and (ii) to channel financing to poorer countries for them to use to adapt or mitigate”.<sup>188</sup> As far as international civil aviation is concerned, States are still struggling with the first challenge: development and implementation of a global market-based measure, which will be acceptable to ICAO Contracting States, with a strong monitoring, reporting, and verification system. The following subsections address this challenge. However, since climate change governance at the global level is a part of global governance, a brief introduction to the concept of global governance is warranted. The next subsection serves this purpose.

---

<sup>182</sup> ICAO, “Vision & Mission”, online: ICAO <[www.icao.int/about-icao/Pages/vision-and-mission.aspx](http://www.icao.int/about-icao/Pages/vision-and-mission.aspx)>.

<sup>183</sup> See e.g. Thomas Bernauer & Lena Maria Schaffer, “Climate Change Governance” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 441; Ghosh & Woods, *supra* note 51.

<sup>184</sup> Bernauer & Schaffer, *supra* note 183 at 441.

<sup>185</sup> *Ibid* at 442.

<sup>186</sup> See also *ibid*.

<sup>187</sup> See ch 4, *above*.

<sup>188</sup> Ghosh & Woods, *supra* note 51 at 475.

### **6.3.2 A brief introduction to global governance**

Like climate change and global warming, global governance is a relatively new concept. Apparently, the term “global governance” was “introduced in the late 1980s, in the context of the international regimes literature”.<sup>189</sup> “At the time of the emergence of the neoliberal institutional paradigm, the emphasis was upon” the likelihood of States cooperating under anarchy through the establishment of international institutions.<sup>190</sup> A related theme in the international regimes literature dealt with increasing “the capacity of international governance to address problems of global concern (“global problems”), first and foremost through the action of international institutions such as” the UN.<sup>191</sup> With the establishment of the UN Commission on Global Governance in 1992 and the publication of such groundbreaking works as *Governance without Government: Order and Change in the World Politics*,<sup>192</sup> the “concept of global governance came into wide public usage in the early 1990s”.<sup>193</sup> Initially, the concept of global governance overlapped with few other related concepts, namely, “international regimes”, “international institutions”, “multilateralism”, and “international governance”.<sup>194</sup> Nevertheless, in the literature of international relations, “contemporary usage in the early twenty-first century refers...to a qualitative change embedded in the demand of political globalization to cope with the challenges of economic globalization and global problems”, e.g., climate change and global warming.<sup>195</sup> The consequence has been a movement from “government” to “governance”, and a simultaneous transformation from “international relations” to “global politics”.<sup>196</sup>

Generally, the term “global governance” is “defined as an instance of governance in the absence of government”.<sup>197</sup> Nonetheless, several definitions of the term “global governance” have been offered. Professor Rosenau, an American political scientist and a renowned international affairs scholar, offers a broad definition of the term. According to Rosenau, “global governance is conceived to include systems of rule at all levels of human activity – from the family to the

---

<sup>189</sup> Kacowicz, *supra* note 180 at 688.

<sup>190</sup> *Ibid.*

<sup>191</sup> *Ibid.*

<sup>192</sup> See James N Rosenau & Ernst-Otto Czempiel, eds, *Governance Without Government: Order and Change in World Politics* (Cambridge: Cambridge University Press, 1992).

<sup>193</sup> Kacowicz, *supra* note 180 at 688.

<sup>194</sup> See *ibid.*

<sup>195</sup> *Ibid.*

<sup>196</sup> See *ibid.*

<sup>197</sup> John Gerard Ruggie, “Foreword” in Thomas G Weiss & Ramesh Thakur, *Global Governance and the UN: An Unfinished Journey* (Bloomington: Indiana University Press, 2010) xv at xv.

international organization – in which the pursuit of goals through the exercise of control has transnational repercussions.”<sup>198</sup> Finkelstein defines global governance as “governing, without sovereign authority, relationships that transcend national frontiers. Global governance is doing internationally what governments do at home.”<sup>199</sup> According to the UN Commission on Global Governance, governance “is the sum of the many ways individuals and institutions, public and private, manage their common affairs.”<sup>200</sup> Governance is “a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken.”<sup>201</sup> The concept of governance includes “formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest.”<sup>202</sup> According to the Commission, the concept, at the global level, “has been viewed primarily as intergovernmental relationships, but it must now be understood as also involving non-governmental organizations (NGOs), citizens’ movements, multinational corporations, and the global capital market.”<sup>203</sup> Likewise, Professors Weiss and Thakur define global governance as “the sum of laws, norms, policies, and institutions that define, constitute, and mediate relations among citizens, society, markets, and the state in the international arena – the wielders and objects of international public power.”<sup>204</sup>

International relations scholar Kacowicz views the concept of global governance as “under the slogan of “governance without government” or as a kind of intermediary stage between the management of global problems through traditional interstate politics and the operation of a world government”.<sup>205</sup> In the absence of a world government, Kacowicz asserts, “the concept of global governance provides us with a proper theoretical terminology to describe and analyze the *complex* of systems of rule-making, political coordination, and problem-solving that transcends states and societies, constructing new political realities and reconstructing old ones.”<sup>206</sup> The concept “does

---

<sup>198</sup> James N Rosenau, “Governance in the Twenty-first Century” (1995) 1:1 *Global Governance* 13 at 13 (HeinOnline).

<sup>199</sup> Finkelstein, *supra* note 180 at 369.

<sup>200</sup> UN, Commission on Global Governance, *Our Global Neighbourhood: The Report of the Commission on Global Governance* (New York: Oxford University Press, 1995) at 2.

<sup>201</sup> *Ibid.*

<sup>202</sup> *Ibid.*

<sup>203</sup> *Ibid* at 2–3.

<sup>204</sup> Thomas G Weiss & Ramesh Thakur, *Global Governance and the UN: An Unfinished Journey* (Bloomington: Indiana University Press, 2010) at 6.

<sup>205</sup> Kacowicz, *supra* note 180 at 690.

<sup>206</sup> *Ibid* at 687 [emphasis in original].

that by describing the structures and processes of governing beyond the state where there is no single supreme supranational political authority”.<sup>207</sup>

### **6.3.3 Requirements for a successful governance**

The existence of governance is not enough to achieve any goal; it has to be successful or effective to attain that goal. Successful governance or effective governance can be referred to as “good governance”. However, this is problematic since how to ensure good governance is a normative question, and, “[l]ike most normative questions in political science, there is no definitive answer to what constitutes good governance.”<sup>208</sup> In fact, “an extensive debate exists about how good governance should be defined.”<sup>209</sup> For example, the minimalist definition of good governance is “the capacity to get things done and to have services delivered.”<sup>210</sup> Political scientist Rothstein contends that there are three requirements for a definition of good governance: first, good governance is “based on a normative theory that gives some orientation for what should be regarded as “good” in this context”; second, any definition of this concept must “take into account that this approach has clearly shifted the interest away from the “input” side of the political system to the “output” side of the political system”; and, third, “universalism, since the good governance approach is *de facto* applied on a global scale”.<sup>211</sup> Professor Peters argues that, “for the purposes of political science as a discipline, and to a great extent also from the perspective of citizens, a conception of good governance that depends upon the capacity to achieve stated policy goals is the most appropriate.”<sup>212</sup> In the absence of a definitive answer to what constitutes good governance, the term “successful governance”, instead of “good governance”, is used in this thesis.

Peters argues that successful governance requires “the fulfillment of at least the four following activities”: goal selection; goal reconciliation and coordination; implementation; and feedback and accountability.<sup>213</sup> He notes that these activities are “basic to the process of governance, and can be elaborated further by considering the processes involved, such as decision-

---

<sup>207</sup> *Ibid.*

<sup>208</sup> B Guy Peters, “Governance as Political Theory” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 19 at 27.

<sup>209</sup> Bo Rothstein, “Good Governance” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 143 at 146.

<sup>210</sup> Peters, *supra* note 208 at 29.

<sup>211</sup> Rothstein, *supra* note 209 at 151 [emphasis in original].

<sup>212</sup> Peters, *supra* note 208 at 27.

<sup>213</sup> *Ibid* at 22.

making, resource mobilization, implementation, and adjudication.”<sup>214</sup> It is also important that any global regime is “both participatory and responsive,” particularly toward developing States, in order to ensure successful governance.<sup>215</sup> These four activities are taken into account while addressing the question how to ensure successful governance in international civil aviation with respect to emissions from aviation.

#### **6.3.4 Actors in climate change governance**

Before commencing the discussion on governance, it is imperative to determine who bears the responsibility to govern; in other words, who are the actors.<sup>216</sup> At the global level, governance embraces various actors, including sovereign States, international institutions/organizations, transnational networks, public agencies (e.g., local authorities), and private agencies (e.g., non-governmental organizations (NGOs)).<sup>217</sup> These actors “function with variable effect and effectiveness, to promote, regulate, and manage the common affairs of humanity”.<sup>218</sup>

Traditionally, in the area of climate change and global warming, “the multilateral treaty-making process overseen by the UN has been equated with climate [change] governance.”<sup>219</sup> Professor Hoffmann asserts that, for the last 25 years, the UN process has essentially been climate change governance.<sup>220</sup> In this respect, the UNFCCC negotiations process plays the main role. From a legal perspective, the *UNFCCC* and the *Kyoto Protocol* are together considered “the backbone” of the current climate change governance system at the global level.<sup>221</sup> From the very beginning, States viewed “themselves as relevant participants in climate [change] governance.”<sup>222</sup> To States,

---

<sup>214</sup> *Ibid* [footnote omitted].

<sup>215</sup> Ghosh & Woods, *supra* note 51 at 475.

<sup>216</sup> See e.g. Konrad Otto-Zimmermann, “Embarking on Global Environmental Governance: Thoughts on the inclusion of Local Governments and other Stakeholders in Safeguarding the Global Environment”, International Council for Local Environmental Initiatives Paper 2011-1 vs2b (2011) at 2, online: ICLEI: Local Governments for Sustainability <[www.iclei.org/fileadmin/PUBLICATIONS/Papers/ICLEI\\_Paper\\_2011-1\\_IEG\\_20110224.pdf](http://www.iclei.org/fileadmin/PUBLICATIONS/Papers/ICLEI_Paper_2011-1_IEG_20110224.pdf)>.

<sup>217</sup> See Kacowicz, *supra* note 180 at 688.

<sup>218</sup> *Ibid*.

<sup>219</sup> Hoffmann, *supra* note 41 at 7. Hoffmann, *ibid*, notes that most studies of climate politics deal with “the negotiation, impact, and effectiveness of this process”, and focus their analyses on the development of major climate change agreements, e.g., the *UNFCCC*, and the *Kyoto Protocol*. Similarly, “[m]ost public international effort has been directed into this multilateral process”.

<sup>220</sup> See *ibid* (“[t]he UN-centered process of multilateral negotiations...has been the key international response to climate change, consisting of annual global conferences and negotiations that produced the UNFCCC, the Kyoto Protocol, and a string of more recent agreements moving towards replacing the Kyoto Protocol” at 8).

<sup>221</sup> Bernauer & Schaffer, *supra* note 183 at 442.

<sup>222</sup> Hoffmann, *supra* note 41 at 9.

“global” denoted “universal, interstate governance through negotiation.”<sup>223</sup> Another significant actor in climate change governance is the UNEP, “the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the [UN] system and serves as an authoritative advocate for the global environment.”<sup>224</sup> However, the UNFCCC negotiations process shapes UNEP’s work on climate change.<sup>225</sup> Under the UN process, the IPCC plays a significant role as “the principal global institution for knowledge-generation in this policy area.”<sup>226</sup> Recently, in spite of the major role played by the UN process, “a nascent system of transnational governance has emerged to address climate change”.<sup>227</sup> This relatively new “decentralized approach to climate [change] governance engages multiple actors at multiple levels and is only loosely connected to the multilateral process.”<sup>228</sup>

Although there exist several UN specialized bodies to deal with different issues, e.g., ICAO for international civil aviation, the International Maritime Organization [IMO] for global shipping industry, no such body exists to deal with global environmental problems, let alone climate change. The UNEP, which is the leading global environmental authority, is merely a “programme”, not an “organization”. Hence, several authors have called for a World Environment Organization to address global environmental problems.<sup>229</sup>

International civil aviation has largely been excluded from the climate change governance structure at the global level. The *UNFCCC* addresses the issue of emissions from aviation, though to a limited extent, by providing that all Parties to the Convention are committed to, *inter alia*, promote and cooperate, in the development, application and diffusion of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>230</sup> in the transport sector.<sup>231</sup> Although aviation does fall within

---

<sup>223</sup> *Ibid* (“[t]he multilateral governance process was constructed as universal interstate negotiations tasked with essentially distributing costs (i.e. emissions reductions), and devising side payments (i.e. development assistance) and flexibility mechanisms (i.e. market measures like cap and trade) to make such costs palatable” at 9).

<sup>224</sup> UNEP, “About UNEP”, online: UNEP <[www.unep.org/about/](http://www.unep.org/about/)>.

<sup>225</sup> See UNEP, *Factsheet: Climate Change*, online: UNEP <[www.unep.org/climatechange/Portals/5/documents/Factsheets/Climate\\_change.pdf](http://www.unep.org/climatechange/Portals/5/documents/Factsheets/Climate_change.pdf)>.

<sup>226</sup> Bernauer & Schaffer, *supra* note 183 at 442.

<sup>227</sup> Hoffmann, *supra* note 41 at 7.

<sup>228</sup> *Ibid* at 8.

<sup>229</sup> See Ghosh & Woods, *supra* note 51 at 455.

<sup>230</sup> *Montreal Protocol on Substances that Deplete the Ozone Layer*, 16 September 1987, 1522 UNTS 3, Can TS 1989 No 42 (entered into force 1 January 1989) [*Montreal Protocol*].

<sup>231</sup> See *UNFCCC*, *supra* note 5, art 4(1)(c).

transport sector, aviation is not explicitly mentioned, and the Convention does not define “transport”. Similar to the *UNFCCC*, the *Kyoto Protocol* identifies the transportation sector as one where measures related to emissions reductions can be implemented.<sup>232</sup> However, unlike the *UNFCCC*, the *Kyoto Protocol* specifically mentions aviation. Article 2(2) provides that Annex I developed State Parties shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the *Montreal Protocol*<sup>233</sup> from aviation and marine bunker fuels, working through ICAO and the IMO, respectively.<sup>234</sup> Thus, ICAO has been provided with “a clear mandate...to be the authoritative body for aviation environmental issues, which the organization has welcomed.”<sup>235</sup> However, emissions from international aviation are kept outside the purview of the *Kyoto Protocol*, since the provision refers to “aviation”, not “international civil aviation” specifically.<sup>236</sup> Therefore, it is argued that the *Kyoto Protocol* includes emissions from domestic civil aviation requiring Annex I developed State Parties to regulate those, but excludes emissions from international civil aviation, leaving such responsibility to ICAO.<sup>237</sup> According to the guidelines of the IPCC and of the UNFCCC,<sup>238</sup> emissions from both national and international aviation should be calculated as part of the national greenhouse gas inventories of Parties, but emissions from international aviation “should be excluded from national totals and reported separately.”<sup>239</sup> Such exclusion has been made due to the disagreement among States on how emissions from

---

<sup>232</sup> See *Kyoto Protocol*, *supra* note 16, art 2(1)(a)(vii); Paul Stephen Dempsey, *Public International Air Law* (Montreal: McGill University, Institute and Center for Research in Air & Space Law, 2008) at 450.

<sup>233</sup> *Montreal Protocol*, *supra* note 230.

<sup>234</sup> *Kyoto Protocol*, *supra* note 16, art 2(2).

<sup>235</sup> Dempsey, *supra* note 232 at 450.

<sup>236</sup> See *ibid.* Emissions from international aviation “are not subject to the limitation and reduction commitments of Annex I Parties under the [UNFCCC] and the Kyoto Protocol.” UNFCCC, “Emissions from fuel used for international aviation and maritime transport (international bunker fuels)”, online: UNFCCC <[unfccc.int/methods/emissions\\_from\\_intl\\_transport/items/1057.php](http://unfccc.int/methods/emissions_from_intl_transport/items/1057.php)> [UNFCCC, “Emissions from fuel used”].

<sup>237</sup> See Milde, *supra* note 3 at 175; Jane Barton, “Including Aviation in the EU Emissions Trading Scheme: Prepare for Take-off” (2008) 5:2 J Eur Env'tl & Plan L 183 at 184 (HeinOnline) [Barton, “Including Aviation”]; Matthew D Kasper, “The Air Transport Association's Challenge to the European Union's Extension of Its Emissions Trading Scheme to International Aviation: A Legal Analysis” (2010) 10:1 Issues in Aviation L & Policy 145 at 153–54 (HeinOnline); Jane Barton, “Tackling Aviation Emissions: the Challenges ahead” (2006) 3:4 J Eur Env'tl & Plan L 316 at 317 (HeinOnline) [Barton, “Tackling”]; Daniel B Reagan, “Putting International Aviation into the European Union Emissions Trading Scheme: Can Europe Do It Flying Solo?” (2008) 35:2 Boston College Env'tl Aff L Rev 349 at 364 (HeinOnline).

<sup>238</sup> Simon Eggleston et al, eds, *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (Hayama, Japan: Institute for Global Environmental Strategies, 2006) [Eggleston, *2006 IPCC Guidelines*].

<sup>239</sup> UNFCCC, “Emissions from fuel used”, *supra* note 236; Amit Garg et al, “Volume 2: Energy” in Eggleston, *2006 IPCC Guidelines*, *supra* note 238 at 3.57.



international aviation can be allocated to a specific State or divided between States.<sup>240</sup>

As mentioned earlier, a binding climate change agreement is expected to be signed at the end of 2015 in Paris. However, as is apparent from the draft negotiating text, emissions from international civil aviation will not be governed by this prospective agreement.<sup>241</sup> According to Article 23bis, State Parties to the agreement would “agree on the need for global sectoral emission reduction targets for international aviation...and on the need for all Parties to work through [ICAO]...to develop global policy frameworks to achieve these targets”.<sup>242</sup> Moreover, pursuant to Article 47.5(b), ICAO would be encouraged “to develop a levy scheme to provide financial support for the Adaptation Fund.”<sup>243</sup> It can be observed that “soft” language is used with respect to emissions from international civil aviation. Hence, even if the prospective agreement becomes a binding treaty, State Parties will not have any “hard” obligation to reduce such emissions working through ICAO.

ICAO’s work in the area of climate change activities involves “cooperation” with a number of other UN bodies, particularly the UNFCCC and its working groups.<sup>244</sup> The Organization participates in UNFCCC conferences, and submits report and provides statement to the UNFCCC Subsidiary Body for Scientific and Technical Advice.<sup>245</sup> The UNFCCC has observer status in

---

<sup>240</sup> See Milde, *supra* note 3 at 175; Barton, “Including Aviation”, *supra* note 237 at 184; Barton, “Tackling”, *supra* note 237 at 317; Dempsey, *supra* note 232 at 450. See also Garg, *supra* note 239 at 3.58–3.59.

<sup>241</sup> See *Paris Agreement: Negotiating text*, *supra* note 155.

<sup>242</sup> *Ibid*, art 23bis.

<sup>243</sup> *Ibid*, art 47.5(b). ICAO has persistently raised its objection against this provision. See *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A38-18, 38th Sess, ICAO Doc 10022, I-68 at I-73, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)> [*ICAO Res A38-18*]; ICAO Council, *Environmental Protection – Developments in other United Nations Bodies and International Organizations*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 32, Doc A38-WP/32/Ex/27 (18 July 2013) at 1, 4, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp032\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp032_en.pdf)>; ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 42nd Sess, Agenda Item 8(c), Paper No 1, Doc FCCC/SBSTA/2015/MISC.4 (27 May 2015) 3 at 7, online: UNFCCC <[unfccc.int/resource/docs/2015/sbsta/eng/misc04.pdf](http://unfccc.int/resource/docs/2015/sbsta/eng/misc04.pdf)> [“ICAO Report to UNFCCC SBSTA 42nd Session”]; ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 39th Sess, Agenda Item 11(f), Paper No 1, Doc FCCC/SBSTA/2013/MISC.20 (10 November 2013) 3 at 6–7, online: UNFCCC <[unfccc.int/resource/docs/2013/sbsta/eng/misc20.pdf](http://unfccc.int/resource/docs/2013/sbsta/eng/misc20.pdf)> [“ICAO Report to UNFCCC SBSTA 39th Session”]; ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 37th Sess, Agenda Item 11(d), Paper No 1, Doc FCCC/SBSTA/2012/MISC.20 (15 November 2012) 3 at 6–7, online: UNFCCC <[unfccc.int/resource/docs/2012/sbsta/eng/misc20.pdf](http://unfccc.int/resource/docs/2012/sbsta/eng/misc20.pdf)> [“ICAO Report to UNFCCC SBSTA 37th Session”].

<sup>244</sup> ICAO Council, *Annual Report 2014: Strategic Objectives: Environmental Protection*, online: ICAO <[www.icao.int/annual-report-2014/Pages/progress-on-icaos-strategic-objectives-safety-environmental-protection-cooperation-with-other-un-bodies.aspx](http://www.icao.int/annual-report-2014/Pages/progress-on-icaos-strategic-objectives-safety-environmental-protection-cooperation-with-other-un-bodies.aspx)>.

<sup>245</sup> See e.g. *ibid*.

ICAO's Committee on Aviation Environmental Protection [CAEP].<sup>246</sup> The ICAO Assembly at its latest session, i.e. 38<sup>th</sup> Session, requested the Council, among others, to:

- “continue to study policy options[, encompassing technical solutions and market-based measures,] to limit or reduce the environmental impact of aircraft engine emissions and to develop concrete proposals and provide advice as soon as possible” to the UNFCCC COP,<sup>247</sup>
- “regularly report” carbon dioxide (CO<sub>2</sub>) emissions from international civil aviation to the UNFCCC, “as part of its contribution to assessing progress made in the implementation actions in the sector based on information approved by its Member States”,<sup>248</sup> and
- “continue to cooperate with” the UNFCCC COP.<sup>249</sup>

It can be inferred, from the ICAO Assembly Resolutions dealing with climate change, that ICAO and its Contracting States view the UNFCCC negotiations process as separate from the ICAO process. At its 38<sup>th</sup> Session, the ICAO Assembly recognized and reaffirmed that the resolution addressing climate change “does not set a precedent for or prejudge the outcome of negotiations under the UNFCCC and its Kyoto Protocol nor represent the position of the Parties to the UNFCCC and its Kyoto Protocol”.<sup>250</sup> Moreover, the Assembly made it clear that the Council's work on global market-based measures for aviation should not be prejudicial to the UNFCCC negotiations.<sup>251</sup> In its reports and statements submitted to the UNFCCC Subsidiary Body for Scientific and Technical Advice, ICAO endeavors to convey the message that the Organization has made “significant” progress toward addressing emissions from international civil aviation, ICAO is the appropriate forum to deal with this issue and, hence, no additional action needs to be initiated under the UNFCCC.<sup>252</sup> For example, at the 42<sup>nd</sup> Session of the UNFCCC Subsidiary Body for Scientific and Technical Advice in June 2015, ICAO asserted that “good progress has been made to address emissions from international aviation and in developing necessary studies and

---

<sup>246</sup> See ICAO, “Committee on Aviation Environmental Protection (CAEP)”, online: ICAO <[www.icao.int/environmental-protection/Pages/Caep.aspx](http://www.icao.int/environmental-protection/Pages/Caep.aspx)> [ICAO, “CAEP”].

<sup>247</sup> *ICAO Res A38-18*, *supra* note 243 at I-70–I-71.

<sup>248</sup> *Ibid* at I-73.

<sup>249</sup> *Ibid* at I-70–I-71.

<sup>250</sup> *Ibid* at I-68, I-71.

<sup>251</sup> See *ibid* at I-72.

<sup>252</sup> See “ICAO Report to UNFCCC SBSTA 42nd Session”, *supra* note 243; “ICAO Report to UNFCCC SBSTA 39th Session”, *supra* note 243; “ICAO Report to UNFCCC SBSTA 37th Session”, *supra* note 243.

analyses for well-informed policy decisions of our Member States.”<sup>253</sup> ICAO concluded that, “[w]ith the increasing engagement of Member States and in close cooperation with the aviation industry and other international organizations, ICAO will continue to work actively to deliver meaningful outcomes at the next Assembly and beyond.”<sup>254</sup> Similar terminologies have been used in previous statements and reports.<sup>255</sup>

Even in such a circumstance, whether or not ICAO has exclusive jurisdiction to deal with the issue of emissions from international civil aviation is debatable. In particular, does the phrase “working through” in Article 2(2) of the *Kyoto Protocol* grant exclusive jurisdiction to ICAO? The *Kyoto Protocol* did not answer the question.<sup>256</sup> Though it has been contended that the phrase “working through” does not confer exclusive jurisdiction to ICAO,<sup>257</sup> regard must be made to the term “shall” that makes the obligation of working through ICAO mandatory.<sup>258</sup>

It has already been noted that the founding and constituting treaty of ICAO, namely the *Chicago Convention*, does not explicitly address the issue of aviation’s environmental impacts, but has imposed a tacit obligation on the Organization to deal with that issue.<sup>259</sup> The phrase “all aspects of international civil aeronautics” definitely includes environmental matters concerning international civil aeronautics.<sup>260</sup> To discharge such responsibility, ICAO can resort to both attributed/explicit powers granted by the *Chicago Convention*,<sup>261</sup> and implied powers, which are,

---

<sup>253</sup> ICAO, *Statement by the International Civil Aviation Organization (ICAO), to the Forty-second Session of the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA42)* (2015), online: UNFCCC <[unfccc.int/files/bodies/sbsta/application/pdf/sbsta42\\_icao\\_statement\\_ver06.pdf](http://unfccc.int/files/bodies/sbsta/application/pdf/sbsta42_icao_statement_ver06.pdf)>.

<sup>254</sup> *Ibid.*

<sup>255</sup> To view all the statements and reports submitted by ICAO to the UNFCCC Subsidiary Body for Scientific and Technological Advice, see ICAO, “Environmental Protection: Statements”, online: ICAO <[www.icao.int/environmental-protection/Pages/statements.aspx](http://www.icao.int/environmental-protection/Pages/statements.aspx)>.

<sup>256</sup> See also Malte Petersen, “The Legality of the EU’s Stand-Alone Approach to the Climate Impact of Aviation: The Express Role Given to the ICAO by the Kyoto Protocol” (2008) 17:2 RECIEL 196 at 202 (Academic Search Complete).

<sup>257</sup> See generally Brian F Havel & John Q Mulligan, “The Triumph of Politics: Reflections on the Judgment of the Court of Justice of the European Union Validating the Inclusion of Non-EU Airlines in the Emissions Trading Scheme” (2012) 37:1 Air & Space L 3 at 25 (Kluwer Law Online); *Air Transport Association of America and others v Secretary of State for Energy and Climate Change*, C-366/10, Advocate General’s Opinion, [2011] ECR I-13765 at I-13817–I-13820; Petersen, *supra* note 256 at 202.

<sup>258</sup> See Havel & Mulligan, *supra* note 257 at 25.

<sup>259</sup> See *Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295, Can TS 1944 No 36, ICAO Doc 7300/9, art 44(i) [*Chicago Convention*].

<sup>260</sup> See ch 3, *above*.

<sup>261</sup> One of the fundamental rules of the law of international organizations is the principle of attributed powers, or the principle of conferred powers, or the principle of speciality, according to which “[i]nternational organizations may only exercise those powers that have been given to them, either when they were created or subsequently.” Niels M Blokker, “International Organizations or Institutions, Implied Powers” in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law

though not explicitly mentioned in the Convention, “considered to come with explicit powers”.<sup>262</sup> Blokker suggests that international organizations should have implied powers for at least two reasons: (a) “it is impossible to spell out in detail in the constituent instrument each and every specific power an international organization will need to perform its functions”; and (b) “it is impossible for their founders to foresee in sufficient detail what specific powers are necessary to perform their functions effectively in an uncertain future”.<sup>263</sup> In the case of ICAO, the Organization was created in 1944 when environmental costs and benefits were regarded as incidental to mainly economic concerns,<sup>264</sup> and, hence, no explicit provisions on how to deal with aviation’s environmental impacts were contained in the *Chicago Convention*. The farsightedness of the drafters of the *Chicago Convention* deserves admiration for using the all-inclusive phrase “all aspects of international civil aeronautics” in the Convention.<sup>265</sup> This opens up the door for ICAO to deal with, and adapt to, changing circumstances that could not be foreseen in 1944, and, hence, are not explicitly provided for in the Convention.

Therefore, it appears that ICAO is the main actor in climate change governance in the field of international civil aviation. In the ICAO process, the following actors also play a significant

---

<opil.oup.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e467>. See also *Legality of the Use by a State of Nuclear Weapons in Armed Conflict*, Advisory Opinion, [1996] ICJ Rep 66 at 78 [*Nuclear Weapons in Armed Conflict*].

<sup>262</sup> Blokker, *supra* note 261. Concerning the UN, the ICJ, in the *Reparation for Injuries Suffered in the Service of the United Nations*, Advisory Opinion, [1949] ICJ Rep 174 at 182, asserted:

Under international law, the Organization must be deemed to have those powers which, though not expressly provided in the Charter, are conferred upon it by necessary implication as being essential to the performance of its duties.

This same principle of implied power was applied by the Permanent Court of International Justice with respect to the International Labor Organization. See *Competence of the International Labour Organization to Regulate, Incidentally, the Personal Work of the Employer* (1926), Advisory Opinion, PCIJ (Ser B) No 13. In *Nuclear Weapons in Armed Conflict* case, *supra* note 261 at 79, the ICJ equated implied powers with subsidiary powers. It should be noted that “there is no consensus about [the] precise scope” of the doctrine of implied powers. Blokker, *supra* note 261, states that “[t]here are at least four limits to implied powers”: “the use of implied powers must be necessary, essential, or indispensable for the organization to perform its functions”; there must not exist “certain explicit powers in the area concerned”; “in using implied powers international organizations must not violate fundamental rules and principles of international law”; and “the use of implied powers must not change the distribution of functions between organs of an international organization.”

<sup>263</sup> Blokker, *supra* note 261.

<sup>264</sup> See Catherine Redgwell, “International Environmental Law” in Malcolm D Evans, ed, *International Law*, 3rd ed (New York: Oxford University Press, 2010) 687 at 687, 690.

<sup>265</sup> *Chicago Convention*, *supra* note 259, art 44, provides:

The aims and objectives of the Organization are to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to:

...

i) Promote generally the development of all aspects of international civil aeronautics.

role apart from the different ICAO bodies and committees: ICAO Contracting States, the aviation industry, airlines, and non-governmental organizations.<sup>266</sup> Like the UN process in global climate change governance, the IPCC plays a significant role in climate change governance in aviation sector as the major global institution for knowledge generation. In response to ICAO's request,<sup>267</sup> the IPCC produced a special assessment report on aviation's contribution to global atmospheric problems.<sup>268</sup> The Panel continues to assess aviation's contribution to climate change and global warming, and includes such assessment in its assessment reports.<sup>269</sup> The next subsection briefly discusses climate change governance structure in international civil aviation.

### **6.3.5 Climate change governance structure in international civil aviation: the role of various actors**

As noted, climate change governance structure in international civil aviation is composed of ICAO bodies and committees, ICAO Contracting States, the aviation industry, airlines, and non-governmental organizations. This subsection discusses their role in climate change governance.

ICAO is made up of an Assembly, a Council, a Secretariat, and other technical bodies that report to the Council.<sup>270</sup> The Assembly is the sovereign body of ICAO and is composed of representatives from all ICAO Contracting States.<sup>271</sup> The Assembly is convened by the Council

---

<sup>266</sup> See e.g. Alejandro Piera Valdés, *Greenhouse Gas Emissions from International Aviation: Legal and Policy Challenges* in Marietta Benkő, ed, *Essential Air and Space Law*, vol 14 (The Hague: Eleven International Publishing, 2015) ch 3; Thomas Buergenthal, *Law-Making in the International Civil Aviation Organization* in Richard B Lillich, ed, *Procedural Aspects of International Law Series*, vol 7 (New York: Syracuse University Press, 1969) at 3–12.

<sup>267</sup> See ICAO, “Aircraft Engine Emissions”, online: ICAO <[www.icao.int/environmental-protection/Pages/aircraft-engine-emissions.aspx](http://www.icao.int/environmental-protection/Pages/aircraft-engine-emissions.aspx)>.

<sup>268</sup> See Joyce E Penner et al, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999).

<sup>269</sup> See e.g. Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013); Ottmar Edenhofer et al, eds, *Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014).

<sup>270</sup> See *Chicago Convention*, *supra* note 259, art 43; ICAO, “How It Works”, online: ICAO <[www.icao.int/about-icao/pages/how-it-works.aspx](http://www.icao.int/about-icao/pages/how-it-works.aspx)> [ICAO, “How It Works”].

<sup>271</sup> See ICAO, “How It Works”, *supra* note 270. Peter Ateh-Afac Fossungu, *A Critique of the Powers and Duties of the Assembly of the International Civil Aviation Organization (ICAO)* (LLM Thesis, McGill University Institute of Air & Space Law, 1996) at 12 [unpublished], contends that, though the ICAO Assembly is “supposed to be supreme”, “ICAO's two-organ nature, its having two top officers[, namely, Council President and Secretary General,] and the fact that its Assembly must be convened only by the Council”, among others, make the Assembly “the most un-supreme of supreme organs in the [UN] system”.

and must meet triennially.<sup>272</sup> An extraordinary meeting may take place “at any time upon the call of the Council or at the request of not less than one-fifth of the total number of contracting States addressed to the Secretary General.”<sup>273</sup> Each ICAO Contracting State is entitled to one vote at the Assembly.<sup>274</sup> Among other powers and duties, the Assembly examines and takes appropriate action on Council reports; reviews in detail the work of ICAO; sets “policy for the coming years”; delegates “to the Council the powers and authority necessary or desirable for the discharge of” ICAO’s duties; considers “proposals for the modification or amendment of” the *Chicago Convention* provisions and, upon approval, recommends “them to the contracting States”; refers “to the Council, to subsidiary commissions, or to any other body any matter within its sphere of action”; decides on “any matter referred to it by the Council”; and deals with “any matter within the sphere of action of the Organization not specifically assigned to the Council”.<sup>275</sup> The phrase “any matter” grants the required jurisdiction to the Assembly to address environmental matters not mentioned in the *Chicago Convention*. This is an example of an explicit implied power provision. However, since use of such implied power is “based on explicit constitutional provisions”, such use, in practice, is strictly viewed “not as an application of the notion of implied powers.”<sup>276</sup>

In every session, the Assembly adopts resolutions that record its decisions and directions to the Council, subsidiary commissions, or any other ICAO body.<sup>277</sup> The latest Assembly resolution dealing with climate change is Resolution A38-18,<sup>278</sup> which records Assembly’s decision reached at its 38<sup>th</sup> Session to develop a global market-based measure for international civil aviation.<sup>279</sup> To achieve this aim, the Assembly, through the same resolution, has requested the Council to perform certain tasks:

- a) finalize the work on the technical aspects, environmental and economic impacts and modalities of the possible options for a global [market-based measure] scheme, including on its feasibility and practicability, taking into account the need for development of international aviation, the proposal of the aviation industry and other international developments, as appropriate, and without prejudice to the negotiations under the UNFCCC;

---

<sup>272</sup> See *Chicago Convention*, *supra* note 259, art 48(a).

<sup>273</sup> *Ibid.*

<sup>274</sup> See *ibid.*, art 48(b).

<sup>275</sup> *Ibid.*, art 49; ICAO, “How It Works”, *supra* note 270.

<sup>276</sup> Blokker, *supra* note 261.

<sup>277</sup> To view the resolutions currently in force, see ICAO, *Assembly Resolutions in Force (as of 4 October 2013)*, ICAO Doc 10022 (2014), online: ICAO <[www.icao.int/publications/pages/publication.aspx?docnum=10022](http://www.icao.int/publications/pages/publication.aspx?docnum=10022)>.

<sup>278</sup> *ICAO Res A38-18*, *supra* note 243.

<sup>279</sup> See *ibid.* at I-72.

- b) organize seminars, workshops on a global scheme for international [civil] aviation participated by officials and experts of [ICAO Contracting] States as well as relevant organizations;
- c) identify the major issues and problems, including for [ICAO Contracting] States, and make a recommendation on a global [market-based measure] scheme that appropriately addresses them and key design elements, including a means to take into account special circumstances and respective capabilities as provided for in paragraphs 20 to 24 below, and the mechanisms for the implementation of the scheme from 2020 as part of a basket of measures which also include technologies, operational improvements and sustainable alternative fuels to achieve ICAO's global aspirational goals; and
- d) report the results of the work in sub-paragraphs a), b) and c) above, for decision by the 39th Session of the Assembly[.]<sup>280</sup>

The Council, composed of 36 States, is the governing body of ICAO, and “gives continuing direction to the work of ICAO.”<sup>281</sup> The Council Member States are elected by the Assembly for a three-year term.<sup>282</sup> The following three criteria are taken into account while electing the Council: (a) “States of chief importance in air transport;” (b) States that “make the largest contribution to the provision of facilities for international civil air navigation;” and (c) States “whose designation will insure that all the major geographic areas of the world are represented on the Council”.<sup>283</sup> The ICAO Council President convenes meetings of the Council.<sup>284</sup> The mandatory functions of the Council include: submitting annual reports to the Assembly; carrying out the directions of the Assembly; discharging its duties and obligations under the *Chicago Convention*; adopting international standards and recommended practices [SARPs] and considering Air Navigation Commission's recommendations for the amendment of SARPs; reporting any infringement of the *Chicago Convention*, and any failure to perform Council's recommendations or determinations, initially to ICAO Contracting States and, if the respective State fails to take appropriate steps within reasonable time after Council's notice, to the Assembly; and considering any matter concerning the *Chicago Convention* referred to it by any Contracting State.<sup>285</sup> Therefore, the Council has a mandatory obligation to perform those tasks related to global market-based measures requested by the Assembly through Resolution A38-18.

Apart from its mandatory functions, the Council is permitted to perform other functions

---

<sup>280</sup> *Ibid* at I-72–I-73.

<sup>281</sup> ICAO, “How It Works”, *supra* note 270. See *Chicago Convention*, *supra* note 259, art 50(a).

<sup>282</sup> See *Chicago Convention*, *supra* note 259, arts 49(b), 50(a).

<sup>283</sup> *Ibid*, art 50(b).

<sup>284</sup> See *ibid*, art 51(a).

<sup>285</sup> See *ibid*, art 54.

which include:

- creation of subordinate air transport commissions on a regional or other basis;
- defining groups of States or airlines with or through which the Council may deal to facilitate the carrying out of the *Chicago Convention's* aims;
- conducting research into all aspects of air transport and air navigation that are of international importance;
- communicating its research results to the ICAO Contracting States;
- facilitating information exchange between ICAO Contracting States on air transport and air navigation matters;
- studying any matters affecting ICAO and the operation of international air transport; and,
- at the request of any ICAO Contracting State, investigating any situation that may appear to present avoidable barriers to international air navigation development, and, after performing such investigation, issuing “such reports as may appear to it desirable”.<sup>286</sup>

The Council is assisted by four subsidiary bodies: the Air Navigation Commission,<sup>287</sup> the Air Transport Committee,<sup>288</sup> the Committee on Joint Support of Air Navigation Services, and the Finance Committee.<sup>289</sup> The Air Navigation Commission considers, and recommends to the Council for adoption, modifications of SARPs.<sup>290</sup>

It is the ICAO Council that has adopted SARPs addressing emissions from aviation, which has been designated Annex 16, Volume II, to the *Chicago Convention*.<sup>291</sup> It will be the Council that will either adopt a new Annex or amend the existing Annex 16, if that is required to give effect to any agreed-to global market-based measure for international civil aviation. In this respect, it should be noted, the Council does not even need any direction from the ICAO Assembly. Any new Annex or any amendments to Annex 16 adopted by the Council becomes effective “within three months after its submission to” the ICAO Contracting States for their approval or “at the end of such longer period of time as the Council may prescribe, unless in the meantime a majority of the

---

<sup>286</sup> *Ibid*, art 55.

<sup>287</sup> The ICAO Council established the Air Navigation Committee under the *Chicago Convention*, *supra* note 259, art 54(e). See also *ibid*, art 56.

<sup>288</sup> The ICAO Council appointed and defined the duties of the Air Transport Committee under the *Chicago Convention*, *supra* note 259, art 54(d).

<sup>289</sup> See ICAO, “How It Works”, *supra* note 270.

<sup>290</sup> See *Chicago Convention*, *supra* note 259, art 57(a).

<sup>291</sup> See ICAO, (2008) 3 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 2, Aircraft Engine Emissions [*Annex 16: Volume 2*].



contracting States register their disapproval with the Council”.<sup>292</sup> However, never in the history of ICAO has a majority of its Contracting States registered their disapproval with the Council, thus blocking the enforcement of any new Annex or any amendment to an existing Annex.

The ICAO Secretariat is divided into five main divisions: the Air Navigation Bureau, the Air Transport Bureau, the Technical Cooperation Bureau, the Legal Bureau, and the Bureau of Administration and Services.<sup>293</sup> ICAO’s Environment Unit is part of the Air Transport Bureau.<sup>294</sup> In the area of environmental protection, the Air Transport Bureau’s focus is on the following issues: quantifying aviation’s impact on the environment “through the development of methodologies, tools, models and databases; and establishing policies, standards and recommended practices to address the impact of aviation on the environment through technological, operational and market-based measures.”<sup>295</sup> The Technical Cooperation Bureau executes ICAO’s Technical Cooperation Programme, which is conducted under the Assembly’s and Council’s broad policy guidance, and provides “advice and assistance in the development and implementation of projects across the full spectrum of civil aviation aimed at[, *inter alia*,] the...environmental protection and sustainable development of national and international civil aviation.”<sup>296</sup>

ICAO’s environmental activities are broadly undertaken through the CAEP.<sup>297</sup> The CAEP, a technical committee of the Council, was established in 1983, and “assists the Council in formulating new policies and adopting new [SARPs] related to aircraft noise and emissions, and more generally to aviation environmental impact.”<sup>298</sup> The Committee “undertakes specific studies, as requested by the Council”, and informs the decision-making of the Council and the Assembly “by providing aviation environmental trends assessment including future air traffic projections and impact assessment of proposed policies and developments.”<sup>299</sup> The CAEP recommends, among

---

<sup>292</sup> *Chicago Convention*, *supra* note 259, art 90(a).

<sup>293</sup> See ICAO, “How It Works”, *supra* note 270.

<sup>294</sup> See ICAO, *Structure of ICAO Secretariat*, 1 June 2014 (Revision No 1), online: ICAO <[www.icao.int/secretariat/Documents/Organigramme\\_en.pdf](http://www.icao.int/secretariat/Documents/Organigramme_en.pdf)>.

<sup>295</sup> ICAO, “Air Transport Bureau”, online: ICAO <[www.icao.int/secretariat/air-transport/Pages/default.aspx](http://www.icao.int/secretariat/air-transport/Pages/default.aspx)> [ICAO, “ATB”].

<sup>296</sup> ICAO, “Technical Cooperation Bureau: Who we are”, online: ICAO <[www.icao.int/secretariat/TechnicalCooperation/Pages/Whoare.aspx](http://www.icao.int/secretariat/TechnicalCooperation/Pages/Whoare.aspx)>.

<sup>297</sup> See ICAO, “Environment Branch: Committee on Aviation Environmental Protection (CAEP)”, online: ICAO <[www.icao.int/publications/Pages/Caep.aspx](http://www.icao.int/publications/Pages/Caep.aspx)>.

<sup>298</sup> ICAO, “CAEP”, *supra* note 246.

<sup>299</sup> *Ibid.*

other things, amendments to the SARPs. The CAEP's recommendations are reviewed and adopted by the ICAO Council and, thereafter, reported to the Assembly.<sup>300</sup> The Air Transport Bureau provides secretariat support to the CAEP.<sup>301</sup>

In the area of climate change and global warming, the CAEP has addressed, and continues to do so, the basket of mitigation measures, which includes technology, operational improvement, sustainable alternative fuels, and market-based measures.<sup>302</sup> Several working groups and task forces within the CAEP have been formed to discharge its responsibilities. Except Working Group 1,<sup>303</sup> all the CAEP groups and task forces are concerned with issues related to climate change and global warming. They are: the Impacts and Science Group, Working Group 2, Working Group 3, Alternative Fuels Task Force, Global Market Based Measure Technical Task Force, the Modelling and Databases Group, the Forecasting and Economic Analysis Support Group, and the Aviation Carbon Calculator Support Group.<sup>304</sup>

The Impacts and Science Group informs the Secretariat and the CAEP “on scientific findings such as aircraft particulate matter impacts; climate impacts of aircraft emissions; and the implication to aviation of limiting the increase in global average temperature to less than 2°C above pre-industrial levels.”<sup>305</sup> Working Group 2 considers, *inter alia*, aircraft emissions issues with respect to airports and operations, and Working Group 3 addresses “aircraft performance and emission technical matters, including the updating of Annex 16 – Volume II and the development of the new aircraft CO<sub>2</sub> Standard, Annex 16 – Volume III.”<sup>306</sup> The Alternative Fuels Task Force is “mandated to assess the potential range of emission reductions from the use of alternative fuels in aviation up to 2050”, and the Global Market Based Measure Technical Task Force is “mandated to develop recommendations for the monitoring, reporting and verification (MRV system) of international aviation emissions and for the quality of offset remits for use in a global market-based measure for international aviation.”<sup>307</sup> The Modelling and Databases Group and the Forecasting and Economic Analysis Support Group provide support to other CAEP working groups. To do so, the former performs “modelling efforts...and maintains various databases”, and

---

<sup>300</sup> See *ibid.*

<sup>301</sup> See ICAO, “ATB”, *supra* note 295.

<sup>302</sup> See ICAO, “CAEP”, *supra* note 246.

<sup>303</sup> Working Group 1 deals with aircraft noise technical issues. See *ibid.*

<sup>304</sup> See *ibid.*

<sup>305</sup> *Ibid.*

<sup>306</sup> *Ibid.*

<sup>307</sup> *Ibid.*

the latter develops and maintains “the databases necessary to provide the framework for performing economic analysis and forecasting fleet growth.”<sup>308</sup> The Aviation Carbon Calculator Support Group “successfully develops and updates an impartial, transparent methodology for computing” carbon dioxide (CO<sub>2</sub>) emissions from passenger air travel.<sup>309</sup>

The aviation industry participates in ICAO Assembly meetings and in ICAO’s CAEP as observers. Notable industry participants are: the International Air Transport Association [IATA], the Airports Council International [ACI], the Civil Air Navigation Services Organisation [CANSO], the International Federation of Air Line Pilots’ Associations [IFALPA], the International Business Aviation Council [IBAC], the International Coordinating Council of Aerospace Industries Associations [ICCAIA], the International Council of Aircraft Owner and Pilot Associations [IAOPA], and the International Federation of Air Traffic Controllers’ Associations [IFATCA]. The engagement of these industry representative bodies in ICAO activities is crucial for the fact they provide ICAO with “invaluable technical expertise and advice”.<sup>310</sup> Assembly meetings are attended by delegates from national civil aviation authorities and transportation ministries/departments of ICAO Contracting States. At the Council, permanent representatives of Council Member States are “either civil servants from [national] civil aviation authorities or career diplomats attached to their ministries of foreign affairs.”<sup>311</sup> Most of these representatives possess a background in aviation.<sup>312</sup> Similarly, at the ICAO Secretariat, most staff members “possess a technical aviation background.”<sup>313</sup> Nonetheless, these industry participants provide necessary practical insights that help ensuring that “rules are drafted in a manner that recognizes the practicalities of the market and the realities of [the aviation] sector”.<sup>314</sup>

In addition to contributing to the ICAO process, these industry participants individually take different initiatives to reduce aviation’s environmental impacts. For example, IATA has established several voluntary programs to reduce emissions from international civil aviation: the alternative fuels program, carbon offset program, and environmental assessment program.<sup>315</sup> Over

---

<sup>308</sup> *Ibid.*

<sup>309</sup> *Ibid.*

<sup>310</sup> Valdés, *supra* note 266 at 98.

<sup>311</sup> *Ibid* at 94.

<sup>312</sup> See *ibid.*

<sup>313</sup> *Ibid.*

<sup>314</sup> *Ibid* at 98.

<sup>315</sup> See International Air Transport Association, “Improving Environmental Performance”, online: IATA <[www.iata.org/whatwedo/environment/pages/index.aspx](http://www.iata.org/whatwedo/environment/pages/index.aspx)> [IATA, “Improving”].

30 member airlines of IATA have introduced a carbon offset program.<sup>316</sup> IATA is currently working on “several initiatives on” cargo sustainability.<sup>317</sup> Moreover, IATA, in partnership with industry stakeholders and governments, is addressing the development of “sensible environmental policies to enable and promote sustainable and eco-efficient air transport.”<sup>318</sup>

The main subjects of ICAO regulations, i.e., airlines, cannot be Parties to the *Chicago Convention*, since only States possess the authority to become so.<sup>319</sup> Hence, airlines do not have any representation at ICAO. In this respect, the participation of IATA is vital since it represents its 250 member airlines.<sup>320</sup> IATA member airlines comprise 83 percent of total air traffic.<sup>321</sup> An important milestone was reached at IATA’s 69<sup>th</sup> Annual General Meeting where airlines agreed to a goal of achieving carbon-neutral growth from 2020 and voiced their support for a single, global market-based measure for international civil aviation.<sup>322</sup> This agreement on the part of the airlines was communicated to the ICAO Assembly in its 38<sup>th</sup> Session through a working paper.<sup>323</sup> It should be noted that, though airlines cannot participate in ICAO processes except through IATA if they are IATA members, States do consider the interests of their flag carriers. This is because, still today, a significant number of airlines are State-owned companies. Even if not State-owned, scheduled international air services cannot take place without bilateral or multilateral agreements among States.<sup>324</sup> Therefore, the voice of the primary subjects of ICAO regulations is being heard at ICAO processes, though not directly.

---

<sup>316</sup> See International Air Transport Association, “IATA Carbon Offset Program”, online: IATA <[www.iata.org/whatwedo/environment/Pages/carbon-offset.aspx](http://www.iata.org/whatwedo/environment/Pages/carbon-offset.aspx)>.

<sup>317</sup> IATA, “Improving”, *supra* note 315.

<sup>318</sup> *Ibid.*

<sup>319</sup> See *Chicago Convention*, *supra* note 259, arts 91–93.

<sup>320</sup> The mission of IATA is to “represent, lead and serve the airline industry. Membership of IATA amounts to some 250 airlines”. International Air Transport Association, “Airlines”, online: IATA <[www.iata.org/Pages/airlines.aspx](http://www.iata.org/Pages/airlines.aspx)>.

<sup>321</sup> See International Air Transport Association, “Home”, online: IATA <[www.iata.org/Pages/default.aspx](http://www.iata.org/Pages/default.aspx)>.

<sup>322</sup> See International Air Transport Association, Press Release, 34, “Historic Agreement on Carbon-Neutral Growth” (3 June 2013), online: IATA <[www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx](http://www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx)>; Fiona Harvey, “Airlines agree to curb their greenhouse gas emissions by 2020”, *The Guardian* (4 June 2013), online: The Guardian <[www.theguardian.com/environment/2013/jun/04/airlines-agree-to-curb-greenhouse-gas-emissions](http://www.theguardian.com/environment/2013/jun/04/airlines-agree-to-curb-greenhouse-gas-emissions)>.

<sup>323</sup> See Airports Council International et al, *Addressing CO<sub>2</sub> Emissions from Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 68, Doc A38-WP/68/Revision no 3/Ex/33 (17 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp068\\_rev3\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp068_rev3_en.pdf)>.

<sup>324</sup> See *Chicago Convention*, *supra* note 259, art 6:

No scheduled international air service may be operated over or into the territory of a contracting State, except with the special permission or other authorization of that State, and in accordance with the terms of such permission or authorization.

Technically, these industry participants are non-governmental organizations [NGOs].<sup>325</sup> However, these NGOs do not represent the global civil society; they represent the aviation industry. In practice, ICAO does not even invite NGOs that represent the civil society at large.<sup>326</sup> Furthermore, none of these industry participants are environmental NGOs. The only environmental NGO that participates in ICAO processes as observer is the International Coalition for Sustainable Aviation [ICSA]. The ICSA is a structured network of environmental NGOs “who share a common concern with civil aviation’s contribution to air quality issues, climate change and noise, and who are committed to developing and providing technical expertise, common policy positions and strategies with a view to reducing emissions and noise from the aviation sector.”<sup>327</sup> To achieve this objective, the ICSA provides “environmental NGOs world-wide with observer status in” ICAO’s CAEP and subsidiary bodies.<sup>328</sup> While ICAO possesses the necessary technical expertise and receives practical perspectives from industry participants, the Organization lacks adequate expertise in the field of environment.<sup>329</sup> ICSA’s involvement fills this gap by providing ICAO with necessary environmental expertise and bringing in different perspectives on environmental issues.

Besides ICAO and aviation industry processes, the EU’s initiative to include airlines from non-EU States in its ETS can be viewed as forming part of climate change governance structure in international civil aviation. As noted in the preceding chapter, the application of the full-scope of EU ETS, i.e. emissions from all aircraft arriving at or departing from an aerodrome located in the territory of any EU Member State, would cover 35 percent of global emissions (i.e. emissions from both domestic and international flights) and about 50 percent of emissions from international civil aviation.<sup>330</sup> The carbon trading scheme will cover 12.5 percent of emissions from international civil aviation in its amended form, i.e. applying only to flights between aerodromes of the European Economic Area [EEA] Member States. It should be noted that, under the EU ETS, it is the EU Member States that administer the scheme.<sup>331</sup>

States in their individual capacity also have taken steps to reduce aviation’s carbon footprint. Some European States implemented taxes on air passengers to reduce emissions from

---

<sup>325</sup> See ICAO, “How It Works”, *supra* note 270.

<sup>326</sup> See Valdés, *supra* note 266 at 99.

<sup>327</sup> International Coalition for Sustainable Aviation, “Home”, online: ICSA <[www.icsa-aviation.org/](http://www.icsa-aviation.org/)>.

<sup>328</sup> *Ibid.*

<sup>329</sup> See generally Valdés, *supra* note 266 at 94–100.

<sup>330</sup> See *Impact Assessment 2013*, *supra* note 6 at 9.

<sup>331</sup> See ch 5, *above*.

aviation. For example, Germany, Austria,<sup>332</sup> France, Bosnia, Serbia, Italy, and Croatia introduced a departure tax on air passengers.<sup>333</sup> Among these States, Germany labels the tax as “ecological air travel levy”.<sup>334</sup>

#### **6.4 Ensuring successful climate change governance in international civil aviation**

As mentioned above, the following four criteria will be employed to ensure successful climate change governance in international civil aviation: goal selection, goal reconciliation and coordination, implementation, and feedback and accountability. Moreover, emphasis is on the participation of States, particularly of developing States, since, as noted, it is important that any global regime is “both participatory and responsive,” particularly toward developing States, in order to ensure successful governance.

The ICAO Assembly, the sovereign body of the Organization, has already set the following goals for international civil aviation: “a global annual average fuel efficiency improvement of 2 per cent until 2020”, “an aspirational global fuel efficiency improvement rate of 2 per cent per annum from 2021 to 2050”, and “a collective medium term global aspirational goal of keeping the global net carbon emissions from international aviation from 2020 at the same level”.<sup>335</sup> As mentioned, IATA member airlines agreed to a goal of achieving carbon-neutral growth from 2020. Therefore, the goals for international civil aviation to combat climate change and global warming have been selected.

However, as discussed in Chapter 4, ICAO Contracting States remain divided on these goals. Forty-two developed European States regarded the goal as “insufficiently ambitious”.<sup>336</sup> On the other hand, nine developing States are not satisfied with that goal for being burdensome on

---

<sup>332</sup> Austria, *Federal Act Introducing an Air Transport Levy (Air Transport Levy Act – FlugAbgG) Federal as amended by Tax Code Amendment Act 2012*, Law Gazette BGBl I No 112/2012, online: BMF: Federal Ministry of Finance <[www.bmf.gv.at/steuern/a-z/flugabgabegesetz/Air\\_Transport\\_Levy.pdf?3vgwui](http://www.bmf.gv.at/steuern/a-z/flugabgabegesetz/Air_Transport_Levy.pdf?3vgwui)>.

<sup>333</sup> See European Business Aviation Association, “Aviation Taxes in Europe: A Snapshot” (15 January 2013), online: EBAA <[www.ebaa.org/documents/document/20140116101401-aviation\\_taxes\\_in\\_europe\\_-\\_a\\_snapshot\\_jan\\_2014.pdf](http://www.ebaa.org/documents/document/20140116101401-aviation_taxes_in_europe_-_a_snapshot_jan_2014.pdf)>.

<sup>334</sup> See “German Air Passenger Departure Tax linked to Environmental Performance draws Airline Protests”, *GREENAIRonline.com* (9 June 2010), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1128](http://www.greenaironline.com/news.php?viewStory=1128)>.

<sup>335</sup> ICAO Res A38-18, *supra* note 243 at I-71.

<sup>336</sup> Lithuania, *Written Statement of Reservation by Lithuania on behalf of the Member States of the European Union and 14 other Member States of the European Civil Aviation Conference (ECAC) with regard to ICAO Assembly Resolution A38-18*, at 1, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania_en.pdf)>.

developing States.<sup>337</sup> Albeit these polar-opposite positions, they agreed to develop a global market-based measure for international civil aviation that is necessary to achieve that goal.

In Assembly Resolution A38-18, the sovereign ICAO body endeavored to ensure goal reconciliation and coordination. The Assembly agreed that these goals would not “attribute specific obligations to individual States”.<sup>338</sup> It was decided that “different circumstances, respective capabilities and contribution of developing and developed States to the concentration of” greenhouse gas emissions from aviation in the atmosphere would “determine how each State may voluntarily contribute to achieving” these goals.<sup>339</sup> The Assembly acknowledged the principle of common but differentiated responsibilities and respective capabilities, and introduced an entirely new principle, namely the principle of special circumstances and respective capabilities.<sup>340</sup> As discussed, developed and developing States resorted to polar-opposite stance with respect to those principles and how to reconcile these differences has already been dealt with in Chapter 4.<sup>341</sup> Particularly, it has been argued that, to ensure more developing State participation, the principle of “common but differentiated responsibilities” should be included in any prospective global market-based measure for international civil aviation. Developing States look for incentives to participate in any global measure,<sup>342</sup> and that principle provide that incentive by, among other things, conferring less responsibility on those States. However, it has been suggested that a new classification of developed and developing States on the basis of, *inter alia*, the size, growth,

---

<sup>337</sup> See Bahrain, *Bahrain’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Bahrain\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Bahrain_en.pdf)>; Brazil on behalf of Argentina, Cuba and Venezuela, Letter Nr.: 416 / BRASICAO, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Brazil\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Brazil_en.pdf)>; China, *Statement of Reservation of China regarding Resolution 17/2 of the 38th Session of the Assembly: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/China\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/China_en.pdf)>; Cuba, OR: CUB-13-126, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Cuba\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Cuba_en.pdf)>; India, *India’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/India\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/India_en.pdf)>; Nicaragua, NIC-ICAO-005/2013, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Nicaragua\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Nicaragua_en.pdf)>; Kingdom of Saudi Arabia, *Saudi Arabia’s Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Saudi\\_Arabia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Saudi_Arabia_en.pdf)>; Venezuela, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Venezuela\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Venezuela_en.pdf)>.

<sup>338</sup> *ICAO Res A38-18*, *supra* note 243 at I-71.

<sup>339</sup> *Ibid.*

<sup>340</sup> See *ibid* at I-68.

<sup>341</sup> See ch 4, *above*.

<sup>342</sup> See e.g. Ghosh & Woods, *supra* note 51 at 455, 475.

average age of fleet, current and projected financial condition including capital, profitability, and competitiveness of airlines should be introduced for the purposes of aviation. While inclusion of this principle in any global scheme for aviation will garner more developing State participation, this new classification will ensure developed States' participation. Because this new classification will cause the elevation of some developing States to developed State status and, simultaneously, demotion of some developed to developing State status.

Undoubtedly, the implementation phase of the selected goals is crucial for the success of the entire governance mechanism. As argued before, these goals can be achieved through the introduction of a global market-based measure for international civil aviation that can be implemented through the adoption of a new Annex or an amendment to existing Annex 16 to the *Chicago Convention*.<sup>343</sup> It may be difficult “to find scholars who explicitly and consistently favor market mechanisms over all other forms of control, including civil and business-to-business regulation”.<sup>344</sup> Nonetheless, “there are enough preferences for “*lite*” modes of regulation in issues such as climate change and carbon markets and enough opposition to hierarchical and statist modes of governance”.<sup>345</sup>

As discussed, Annexes to the *Chicago Convention* become *de facto* “hard law” when economically powerful States comply with them and, importantly, the ILC considers Annex 16, Volume II,<sup>346</sup> as one of the multilateral agreements relating to air pollution.<sup>347</sup> Hence, any new Annex or an amendment to Annex 16 will force the ICAO Contracting States to comply with that change. Adoption of a new Annex or amending Annex 16 may be an easier, faster, and more flexible process than amending the Convention or drafting a new treaty.<sup>348</sup>

It has been suggested that ICAO should adopt a market-based measure for all its Contracting States by way of a Standard.<sup>349</sup> Standards are defined as those specifications which

---

<sup>343</sup> See ch 4, *above*.

<sup>344</sup> David Levi-Faur, “From “Big Government” to “Big Governance”?” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 3 at 11.

<sup>345</sup> *Ibid* [emphasis in original].

<sup>346</sup> *Annex 16: Volume 2, supra* note 291.

<sup>347</sup> See ILC, *First Report, supra* note 96 at 19.

<sup>348</sup> See Jin Liu, “The Role of ICAO in Regulating the Greenhouse Gas Emissions of Aircraft” (2011) 5:4 Carbon & Climate L Rev 417 at 425 (Academic Search Complete).

<sup>349</sup> See Armand de Mestral & Md Tanveer Ahmad, “A Pre-Analysis of Canada–EU Aviation Relations post-ICAO Assembly Meeting Concerning Emissions Trading System”, Policy Brief, Carleton University Canada-Europe Transatlantic Dialogue (April 2013) at 7, online: Carleton University <[labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2013-04-brief-demestral-ahmad-mcgill-aviation-emissions.pdf](http://labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2013-04-brief-demestral-ahmad-mcgill-aviation-emissions.pdf)>.



are “recognized as *necessary* for the safety or regularity of international air navigation and to which Contracting States *will conform* in accordance with” the *Chicago Convention*.<sup>350</sup> On the contrary, according to the definition of “Recommended Practices”, these specifications are “recognized as *desirable* in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States *will endeavour to conform* in accordance with” the *Chicago Convention*.<sup>351</sup>

There is one more reason why the global market-based measure should be adopted by way of a Standard. According to Article 12 of the *Chicago Convention*, rules established under the Convention are binding on the aircraft of ICAO Contracting States flying over the high seas.<sup>352</sup> A thorough reading of the entire Article 12 reveals that these rules relate to “rules governing the flight and maneuver of aircraft”.<sup>353</sup> There exists controversy as to “[w]hether the phrase “rules...established under this Convention” refers to international standards as well as to recommended practices”.<sup>354</sup> The ICAO Council made it clear that Annex 2, titled *Rules of the Air*,<sup>355</sup> established rules governing the flight and maneuver of aircraft “within the meaning of Article 12 and was mandatory over the high seas.”<sup>356</sup> Worth mentioning is the fact that, though the *Chicago Convention* does not apply to State aircraft,<sup>357</sup> the ICAO Assembly resolved that the regulations and procedures established by the ICAO Contracting States “to govern the operation of their state aircraft over the high seas *shall ensure* that these operations do not compromise the safety, regularity and efficiency of international civil air traffic and that, to the extent practicable, these operations comply with the rules of the air in Annex 2”.<sup>358</sup> Annex 2, though initially contained two recommended practices,<sup>359</sup> contains only Standards,<sup>360</sup> and these Standards are binding on the aircraft of any ICAO Contracting State flying over the high seas. The ICAO Council

---

<sup>350</sup> *Annex 16: Volume 2, supra* note 291 at x [emphases added].

<sup>351</sup> *Ibid* [emphases added].

<sup>352</sup> See *Chicago Convention, supra* note 259, art 12.

<sup>353</sup> Buergenthal, *supra* note 266 at 80.

<sup>354</sup> *Ibid* at 80–81 [footnote omitted].

<sup>355</sup> ICAO, (2005) 10 International Standards: Annex 2 to the Convention on International Civil Aviation: Rules of the Air [*Annex 2*].

<sup>356</sup> Buergenthal, *supra* note 266 at 81–82.

<sup>357</sup> See *Chicago Convention, supra* note 259, art 3.

<sup>358</sup> *Consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation*, ICAO Assembly Res A38-12, 38th Sess, ICAO Doc 10022, II-5 at II-15, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)> [emphasis added].

<sup>359</sup> See Buergenthal, *supra* note 266 at 82.

<sup>360</sup> See *Annex 2, supra* note 355.

possesses the authority under Article 12 “to designate as mandatory over the high seas a number of international standards which do not at present enjoy this status.”<sup>361</sup> Emissions occurring over the high seas should be accounted, and this can be ensured by the Council designating the Standard enforcing the global market-based measure as mandatory over the high seas.

As noted in earlier chapters, except with respect to Annex 2, the other 18 Annexes to the *Chicago Convention* are considered *de jure* soft law.<sup>362</sup> Soft law is a type of social or moral rather than legal norm.<sup>363</sup> In the literature, soft law “has been widely criticized and even dismissed as a factor in international affairs.”<sup>364</sup> However, in international law, soft law’s power to influence behavior of actors should not be underestimated. Abbott and Snidal argue that “international actors often deliberately choose softer forms of legalization as superior institutional arrangements.”<sup>365</sup> According to them, “soft law is sometimes designed as a way station to harder legalization, but often it is preferable on its own terms.”<sup>366</sup> It “offers many of the advantages of hard law, avoids some of the costs of hard law, and has certain independent advantages of its own.”<sup>367</sup> For example, soft law is often easier to achieve than hard laws, since “one or more of the elements of legalization can be relaxed”.<sup>368</sup> Moreover, soft law “provides certain benefits not available under hard [laws]”: soft law “offers more effective ways to deal with uncertainty, especially when it initiates processes that allow actors to learn about the impact of agreements over time.”<sup>369</sup> Again, soft law “facilitates compromise, and thus mutually beneficial cooperation, between actors with different interests and values, different time horizons and discount rates, and different degrees of power.”<sup>370</sup> Dupuy aptly notes:

Albeit indirect, the legal effect of “soft” law is nevertheless real. “Soft” law is not merely a new term for an old (customary) process; it is both a sign and product of the permanent state of multilateral cooperation and competition among the heterogeneous members of the contemporary world community.

---

<sup>361</sup> Buergenthal, *supra* note 266 at 84 [footnote omitted].

<sup>362</sup> See ch 3, 4, *above*.

<sup>363</sup> See Dinah Shelton, “Soft Law” in David Armstrong, ed, *Routledge Handbook of International Law* (Oxford: Routledge, 2009) 68 at 69. See also Daniel Thürer, “Soft Law” in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law <opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1469>.

<sup>364</sup> Kenneth W Abbott & Duncan Snidal, “Hard and Soft Law in International Governance” (2000) 54:3 Intl Organization 421 at 422.

<sup>365</sup> *Ibid* at 423.

<sup>366</sup> *Ibid*.

<sup>367</sup> *Ibid* [footnote omitted].

<sup>368</sup> *Ibid*.

<sup>369</sup> *Ibid* [footnote omitted].

<sup>370</sup> *Ibid*.

The existence of “soft” law compels us to re-evaluate the general international law-making process[.]<sup>371</sup>

Emissions from aviation is a relatively new environmental issue, and the decision to apply market-based measures in international civil aviation will be a novel and highly ambitious endeavor to tackle climate change and global warming from a specific global sector. States are still hesitant to consent to a binding decision; they are unsure about the success of market-based measures in curbing such emissions to achieve aviation’s goals without affecting the growth of the industry. In such circumstances, it is crucial to ensure flexibility of the mitigation measures.<sup>372</sup> It is thus preferable to resort to Annexes for the implementation of a global market-based measure for international civil aviation. As soft law instruments, Annexes will offer more effective ways to deal with this relatively new phenomenon in international civil aviation, namely, emissions from aviation that contribute to climate change and global warming. In this way, the ICAO Contracting States will get necessary time to learn about the success of such measures in governing emissions from international civil aviation.

As mentioned earlier, the ICAO Council, assisted by the CAEP, can adopt a new Annex addressing environmental issues or amend existing Annex 16 addressing the same. The Council, in turn, submits it to each ICAO Contracting States for their approval, which becomes effective within three months after this submission or “at the end of such longer period of time as the Council may prescribe, unless in the meantime a majority of the contracting States register their disapproval with the Council”.<sup>373</sup> Again, the Council can adopt SARPs with respect to market-based measures without any agreement reached within the ICAO Assembly. Since developing States are still unsure about the possible impacts of a global market-based measure on their airlines, they are in a dilemma to support such a measure for international civil aviation.<sup>374</sup> Therefore, if the Council adopts any new Annex or any amendments to Annex 16, i.e. SARPs, to give effect to such an economic measure in the absence of States’ agreement with respect to the same reached within the ICAO Assembly, these developing States will probably refrain from notifying their approval. This silence will not theoretically affect the effectiveness of these SARPs in question, since express

---

<sup>371</sup> Pierre-Marie Dupuy, “Soft Law and the International Law of the Environment” (1990–1991) 12:2 *Mich J Intl L* 420 at 435 (HeinOnline).

<sup>372</sup> See Takashi Hongo, “Market-Based Measures: Offset Credits as an Option for “Destination Green”” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 146 at 146.

<sup>373</sup> *Chicago Convention*, *supra* note 259, art 90(a).

<sup>374</sup> See ch 4, *above*.

disapproval to these measures by a majority of ICAO Contracting States is required to stop their enforcement. Nonetheless, this will practically undermine their effectiveness due to non-compliance by developing States, who are the majority at ICAO. The situation will be worse if a majority of economically powerful States decides to abstain from complying with these SARPs. Hence, it is crucial to remove the doubts of the developing States. To achieve this goal, it is important to engage them in ICAO activities related to environmental protection. To secure their engagement in ICAO activities, the Organization in April 2015 held aviation dialogues on market-based measures to address climate change in five ICAO regions.<sup>375</sup> Nevertheless, it is more important to ensure appropriate representation of the developing States in the CAEP through which ICAO's environmental activities are broadly undertaken. Ghosh and Woods contend that, in addition to offering direct incentives, more representation of developing States in decision-making has to be ensured to secure their participation.<sup>376</sup>

At present, twenty-three States are CAEP members. Among them, eight States, i.e., 34.78 percent, are developing States: Argentina, Brazil, South Africa, Egypt, Tunisia, China, India, and Singapore. The remaining fifteen States, i.e., the majority (65.22 percent), are developed States: Canada, the US, Japan, Australia, the Russian Federation, and ten developed European States (Germany, France, Italy, Spain, the United Kingdom [UK], Poland, the Netherlands, Sweden, Ukraine, and Switzerland). Except Switzerland, all these European States are EU Member States. Among the six observer States, three are developed European States (Greece, Norway, and Turkey), and rest three Asian developing States (Indonesia, Saudi Arabia, and the United Arab Emirates [UAE]). The EU has observer status as well.

It appears, therefore, that developing States do not have sufficient participation in the CAEP.<sup>377</sup> This issue of democratic-deficit has to be addressed on a priority basis. As stated before, successful governance warrants a global regime that is, among others, participatory toward developing States, and more representation of such States in decision-making can garner their participation. Indeed, during the 38<sup>th</sup> Session, 18 Latin American Civil Aviation Commission Member States raised their concern regarding the issue of developing States' representation in the

---

<sup>375</sup> See ICAO, "Global Aviation Dialogues (GLADs)", online: ICAO <[www.icao.int/meetings/GLADs-2015/Pages/default.aspx](http://www.icao.int/meetings/GLADs-2015/Pages/default.aspx)>.

<sup>376</sup> See Ghosh & Woods, *supra* note 51 at 458.

<sup>377</sup> See also Valdés, *supra* note 266 at 96–97.

CAEP, and proposed a higher level of representation of developing States in that group.<sup>378</sup>

Democratic-deficit is not an issue as far as the ICAO Council is concerned, although proposals to increase Council members have unsuccessfully been tabled at several Assembly sessions.<sup>379</sup> Among the thirty-six ICAO Council Member States for the 2014 – 2016 period, twenty-three are developing States (63.89 percent), and thirteen are developed States (36.11 percent).<sup>380</sup> Hence, it can be expected that, if sufficient representation of developing States in CAEP is ensured, developing State members of the ICAO Council would not block any CAEP recommendation with respect to the adoption of a new Annex or an amendment of existing Annex 16 to give effect to the global market-based measure for international civil aviation. Furthermore, any resultant SARPs will see more developing States' participation.

After completion of the legislation phase, ICAO will need to administer the system. It has been recommended in the previous chapter that a new branch/section within ICAO can be set up to deal with the revenues generated from any multilateral market-based measure.<sup>381</sup> In fact, a separate ICAO body should be created to administer any agreed-to global market-based measure with all pertaining responsibilities. Article 43 of the *Chicago Convention* authorizes the creation of “such other bodies as may be necessary.”<sup>382</sup> One of the crucial roles of that body will concern monitoring, reporting, and verification [MRV] segment of the global measure. It should be noted that, it would not be the first time that ICAO accepts the responsibility of auditing States. In the field of safety and security, ICAO already has audit programs, namely, the Universal Safety Oversight Audit Programme Continuous Monitoring Approach (USOAP CMA) and the Universal Security Audit Programme Continuous Monitoring Approach (USAP CMA), respectively.<sup>383</sup>

---

<sup>378</sup> See Aruba et al, *Civil Aviation Developments in Latin America in Support of Air Transport Sustainability in the Region*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 317, Doc A38-WP/317/Ex/109 (10 September 2013) at 2–3, online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp317\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp317_en.pdf)>.

<sup>379</sup> See Valdés, *supra* note 266 at 93.

<sup>380</sup> At the ICAO Council, States of chief importance in air transport are: Australia, Brazil, Canada, China, France, Germany, Italy, Japan, the Russian Federation, the UK, and the US. States which make the largest contribution to the provision of facilities for international civil air navigation are: Argentina, Egypt, India, Mexico, Nigeria, Norway, Portugal, Saudi Arabia, Singapore, South Africa, Spain, and Venezuela. States ensuring geographic representation are: Bolivia, Burkina Faso, Cameroon, Chile, Dominican Republic, Kenya, Libya, Malaysia, Nicaragua, Poland, Republic of Korea, the UAE, and the United Republic of Tanzania. See ICAO, “Council States 2014-2016”, online: ICAO <[www.icao.int/about-icao/Pages/council-states-2014-2016.aspx](http://www.icao.int/about-icao/Pages/council-states-2014-2016.aspx)>.

<sup>381</sup> See ch 5, *above*.

<sup>382</sup> *Chicago Convention*, *supra* note 259, art 43.

<sup>383</sup> To learn more about these audit programs, see ICAO, “USOAP Continuous Monitoring Approach”, online: ICAO <[www.icao.int/safety/CMAForum/Pages/default.aspx](http://www.icao.int/safety/CMAForum/Pages/default.aspx)>; ICAO, “The Universal Security Audit Programme Continuous Monitoring Approach (USAP-CMA) and its Objective”, online: ICAO <[www.icao.int/Security/USAP/Pages/default.aspx](http://www.icao.int/Security/USAP/Pages/default.aspx)>.

Implementation of these audit programs is a classic example of ICAO using its implied powers under the *Chicago Convention*. The Convention does not provide for these audit programs. Nonetheless, establishment of these audit programs was necessary to perform the functions related to ensuring safety and security bestowed on the Organization by the Convention: ensure “the safe and orderly growth of international civil aviation throughout the world”; “[m]eet the needs of the peoples of the world for safe, regular, efficient and economical air transport”; and “[p]romote safety of flight in international air navigation”.<sup>384</sup> Compliance by ICAO Contracting States with SARPs established under the Convention to ensure safety and security is crucial for ICAO to meet its objectives. These audit programs help ensuring States’ compliance with these SARPs.

Under the MRV of emissions from international civil aviation, a multilevel governance approach should be adopted. In this respect, the EU model of MRV under its ETS can be adopted. Under the EU ETS, aircraft operators need to have an approved monitoring plan, “according to which they monitor and report their emissions” for a given year.<sup>385</sup> An accredited verifier must have substantiated the data in the annual emissions report. After the verification, aircraft operators surrender the equivalent number of allowances by a certain deadline.<sup>386</sup> In the global model, airlines should annually report their emissions to their respective State of registration. Thereafter, the respective ICAO Contracting State should, after duly verifying these reports, file such reports to the ICAO body in charge of MRV. The designated ICAO body should be in charge of approving the monitoring plans submitted by airlines. States should appoint their own accredited verifier. However, prior approval with respect to the verifier must be obtained from the designated ICAO body. Since the ICAO Council regularly reports carbon dioxide (CO<sub>2</sub>) emissions from international civil aviation to the UNFCCC,<sup>387</sup> the Organization already possesses information related to such emissions. Hence, it would not be extremely difficult for the new ICAO body in charge of MRV to perform its assigned obligations.

The responsible ICAO body’s role concerning the revenues generated from any multilateral market-based measure is no less important. It has been suggested in Chapter 4 that, among the three options for a global market-based measure under consideration by ICAO, two options with

---

<sup>384</sup> *Chicago Convention*, *supra* note 259, art 44.

<sup>385</sup> European Commission, “Monitoring, reporting and verification of EU ETS emissions”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/ets/monitoring/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/monitoring/index_en.htm)>.

<sup>386</sup> See *ibid.*

<sup>387</sup> See *ICAO Res A38-18*, *supra* note 243 at I-73.

revenue generation should be preferred.<sup>388</sup> These two options are: global mandatory offsetting with revenue and global emissions trading. These two options are preferable to the other option, namely global mandatory offsetting, since funds generated thereunder would create a revenue stream that could be used to mitigate the environmental impacts of aircraft engine emissions as well as assistance to and support for developing States. This will provide another incentive for developing States to participate in the global measure. In this respect, the responsible ICAO body should be assigned the responsibility to verify and monitor that incentive, i.e. whether funds are being transferred to developing States. Experience reveals that developing States are seriously concerned with “verification and monitoring of any promised incentives.”<sup>389</sup>

After the implementation phase comes the feedback and accountability phase. This final phase is vital “both for improving the quality of the decisions being made and also for democratic accountability.”<sup>390</sup> Peters stresses that “some well-developed method of feedback must be built into the governance arrangements.”<sup>391</sup> NGOs can play a significant role in this respect. Industry NGOs (e.g., IATA), environmental NGOs (e.g., ICSA), and NGOs representing the global civil society at large all can play a part here. As mentioned, IATA already has a voluntary carbon offset program, and over 30 IATA member airlines have introduced that program. This invaluable experience of IATA in market-based measures can be very useful in the feedback and accountability phase. Environmental NGOs already possess valuable knowledge and experience with respect to market-based measure and, hence, these NGOs can provide effective feedback.

The involvement of NGOs that represent global civil society can be questioned for the fact that a fraction of global population uses air transport as passengers. Nonetheless, it should be underscored that the global population uses aviation in various ways. Aviation is a means not only for passenger transportation but also for the transportation of goods. In 2013, world airlines carried over three billion passengers. Though aviation carries “around 0.5% of the volume of world trade shipments, it is over 35% by value.”<sup>392</sup> Very high value commodities, perishable, and time-sensitive goods are shipped by aviation.<sup>393</sup> Furthermore, a significant amount of global population

---

<sup>388</sup> See ch 4, *above*.

<sup>389</sup> Ghosh & Woods, *supra* note 51 at 457.

<sup>390</sup> Peters, *supra* note 208 at 22.

<sup>391</sup> *Ibid.*

<sup>392</sup> Air Transport Action Group, “Facts & Figures”, online: ATAG <[www.atag.org/facts-and-figures.html](http://www.atag.org/facts-and-figures.html)> (visited August 21, 2015).

<sup>393</sup> See *ibid.*

depends on aviation for their living. Globally, “8.7 million people work directly in the aviation industry.”<sup>394</sup> In such a circumstance, these NGOs should be given an opportunity to take part in ICAO processes, both in decision-making process, and in feedback and accountability phase. Since these NGOs represent civil society at large, their involvement in feedback and accountability phase can arguably help assuring democratic accountability. With respect to such NGOs, Valdés states:

Climate change is a complex issue characterized by different interests. It should be in the best interest of the whole process that all parties, including those representing civil society at large, are given a fair opportunity to participate. Restricting access to these organizations or not providing them with a level playing field may reflect an unintentional bias which may be detrimental to the rule-making process.<sup>395</sup>

At its 39<sup>th</sup> Session in 2016, if the ICAO Assembly fails to decide on a global market-based measure for international civil aviation to be implemented from 2020, the following three options can be utilized. First, the Assembly can take the final decision at its 40<sup>th</sup> Session in 2019, i.e. one year before the implementation of the measure. However, the Assembly need not wait that long; it can take the decision prior to 2019, and even before 2016. The *Chicago Convention* does not provide that the Assembly cannot meet more than once in three years; it provides that the Assembly must “meet not less than once in three years”.<sup>396</sup> Again, there remains room for holding an extraordinary meeting “*at any time* upon the call of the Council or at the request of not less than one-fifth of the total number of contracting States addressed to the Secretary General.”<sup>397</sup> Due to the urgency of the issue of climate change and global warming, an extraordinary meeting of the Assembly is warranted to take decision on market-based measures.

Another option to govern aircraft engine emissions is more participation of airlines in IATA’s carbon offset program. In any case, airlines would be the subject of any global market-based measure. IATA’s 250 member airlines represent 83 percent of global traffic and, hence, their participation in that voluntary program can make a real change. Since the airline industry supports a global market-based measure in contrast to unilateral ones, e.g., the EU ETS, they should participate in the IATA program in the case of failure of the ICAO Assembly to decide on a global measure.

If all of the above options fail, economically powerful States should adopt unilateral

---

<sup>394</sup> *Ibid.*

<sup>395</sup> Valdés, *supra* note 266 at 100.

<sup>396</sup> *Chicago Convention*, *supra* note 259, art 48(a).

<sup>397</sup> *Ibid* [emphasis added].



market-based measures of the same model. Worth noting is the fact that most members of the Umbrella Group (Australia, Canada, Japan, New Zealand, Kazakhstan, Norway, the Russian Federation, Ukraine, and the US) and the Arctic Five (Canada, the Russian Federation, the US, Norway, and Denmark), who are “instrumental” in delaying progress in global climate change negotiations, are present in both the ICAO Council and the CAEP. At the Council, most of them are States of chief importance in air transport. If they play the same negotiating strategy to delay progress as they have done, and continue to do so, at the global level, the implementation of a global market-based measure for international civil aviation will be delayed further. Instead of hampering progress, they can make a material change in the governance of emissions from international civil aviation by utilizing their economic power as well as their influence as States of chief importance in air transport. They can do this by: first, endeavoring to influence other Council Member States to agree on a new Annex or to an amendment to Annex 16; second, if they fail in this endeavor, by adopting unilateral market-based measures of the same model.

As suggested in Chapter 5,<sup>398</sup> the EU ETS can serve as a model in this respect. It was argued that, if non-EU economically powerful States, e.g., the US, Canada, China, and Russia, come forward by adopting their own emissions trading scheme of the same model, it will significantly reduce emissions from aviation globally. Furthermore, airlines from those non-EU States will be able to avoid complying with the EU ETS, since adoption of such measures by non-EU States having “an environmental effect at least equivalent to that of” the EU ETS renders airlines of those non-EU States qualified for exemption from the scheme.<sup>399</sup> A concerted practice of this nature, in the absence of a global market-based measure, can give rise to a global model that will significantly reduce emissions from aviation. Such national or regional, in other words “unilateral”, measures of the same model adopted by economically powerful States will induce other States either to comply with these schemes or, if they want to be exempted, to develop and implement their own schemes following the same model. This inducement will occur because non-compliance by airlines from economically weak States will lead to the banning of these airlines by those economically powerful States that will, in consequence, isolate these airlines from the global economy.<sup>400</sup> In addition to ensuring access to these lucrative markets, States will model their

---

<sup>398</sup> See ch 5, *above*.

<sup>399</sup> *Directive 2008/101*, *supra* note 127 at 5, 14.

<sup>400</sup> See ch 5, *above*.

market-based measure on the EU ETS simply because it is easier to adopt an existing system, which has been “developed through relatively sophisticated technical administrative processes”, than to attempt to reinvent a system without possessing the necessary resources available to the US and Europe.<sup>401</sup>

To ensure successful governance, it is further important that European States, which levy “environmental” taxes on departing passengers, cease imposing such charges. Since the EU ETS is effective and applies to all flights departing from and arriving at aerodromes located in the EEA States, there is no necessity to levy taxes on airlines for departing passengers. Continuing to levy such taxes on airlines would mean that airlines have to pay twice for the same cause, which would affect the business of those airlines serving these States. Ceasing the practice of taxing is vital to persuade non-EU flag carriers to participate in the EU ETS. Airlines now prefer a global framework since they are concerned with “duplication with existing measures, or the layering of measures within a State or a group of States.”<sup>402</sup> Ciolino argues that a patchwork or fragmentation of measures may “create a “political maelstrom,” and instigate repeat challenges within the [World Trade Organization] on whether the imposition of these measures on members, without their consent, is based on protectionist motives.”<sup>403</sup>

Additionally, emissions trading can serve better than carbon taxes in achieving environmental goals. Meckling and Hepburn compared carbon taxes with emissions trading. They found that carbon taxes are “more efficient under uncertainty”, “likely involve lower administrative costs than the creation of a market”, and “likely to provide a more stable signal for investors”.<sup>404</sup> Nonetheless, with respect to emissions trading, they found that “*only* emissions

---

<sup>401</sup> Gregory Shaffer & Daniel Bodansky, “Transnationalism, Unilateralism and International Law” (2012) 1:1 *Transnational Environmental L* 31 at 33.

<sup>402</sup> The aviation industry stated that:

Any MBM applied to aviation must be global in scope, preserve fair competition, and take account of different types and levels of operator activity. The safe, orderly and efficient functioning of today’s air transport system relies on a high degree of uniformity in regulations, standards and procedures. The use of unilateral measures undermines this foundation. *Particular attention needs to be given to avoid duplication with existing measures, or the layering of measures within a State or a group of States.*

Airports Council International et al, *supra* note 323 at 2–3 [emphasis added]. See also Andreas Hardeman, “Reframing Aviation Climate Politics and Policies” (2011) 36 *Ann Air & Sp L* 1 at 27; Tate L Hemingson, “Why Airlines Should Be Afraid: The Potential Impact of Cap and Trade and Other Carbon Emissions Reduction Proposals on the Airline Industry” (2010) 75:3 *J Air L & Com* 741 at 772 (HeinOnline).

<sup>403</sup> Ciolino, *supra* note 128 at 1182 [footnotes omitted].

<sup>404</sup> Jonas Meckling & Cameron Hepburn, “Economic Instruments for Climate Change” in Robert Falkner, ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013) 468 at 474.

trading guarantees a particular environmental outcome.”<sup>405</sup> Again, emissions trading “appears to fit better with the international nature of the problem”, “creates clearer opportunities for entrepreneurs to find new ways to reduce emissions and reduce costs of mitigation”, and “leverages the profit motive of firms who are more likely to support it”.<sup>406</sup> They further contend that “the evidence so far suggests that [emissions] trading has more appealing political features”.<sup>407</sup> Hence, instead of continuing their tax system, these EU Member States must concentrate on a global market-based measure and effectively implement the EU ETS until the global measure comes into effect.

## **6.5 Conclusion**

States are well aware of the existence and dangers of climate change and global warming. They also acknowledge the necessity of immediate actions to reduce anthropogenic emissions that contribute to those processes. However, most States either are inactive or actively attempt to frustrate any progress in climate change negotiations. Their inactivity can be explained by the fact that States do not feel any real pressure from their citizens to take any action in this regard. Both States and their citizens are concerned with their short-term self-interest and, thus, are disinclined to adopt any necessary action to reverse the effects of climate change and global warming. Capitalism is mostly responsible for this motivation. However, due to the difficulty of rejecting capitalism altogether, several solutions, namely sustainable development, sustainable capitalism, and climate capitalism, have been suggested that do not discard but provide a new method of practicing capitalism. Market-based measures form part of these solutions. It is challenging to deploy these solutions globally due to the absence of any single global order, e.g., a world government.

Since it is not possible to have a world government in present circumstances as well as in the foreseeable future, recourse must be made to global governance in climate change, in other words, climate change governance at the global level, which can enable employment of these solutions. Since market-based measures, whether a global one or unilateral ones of a single type, are temporarily required to reduce aviation’s climate change and global warming impacts,

---

<sup>405</sup> *Ibid* [emphasis added].

<sup>406</sup> *Ibid.*

<sup>407</sup> *Ibid.*

successful climate change governance in international civil aviation has to be ensured. In this respect, ICAO, as the global forum of States for international civil aviation, can play a significant role.

This chapter reveals that two out of four criteria to attain successful global governance have been met in the aviation sector.<sup>408</sup> However, the most critical phase, namely implementation, has yet to be achieved. ICAO's CAEP should recommend the adoption of a new Annex or an amendment to existing Annex 16 to give effect to any agreed-to global market-based measure. However, representation of developing States in ICAO's CAEP should be increased to secure more developing States' approval to CAEP recommendations toward reducing emissions from aviation. A new body has to be created within ICAO to discharge the Organization's responsibilities concerning any global market-based measure. In any case, the supreme body of ICAO, the Assembly, must not wait for three years for another session to decide the fate of any market-based measure proposed by the ICAO Council. The Council should convene, if necessary, an extraordinary session of the Assembly to resolve the issue.

For feedback and accountability of market-based measures, NGO participation should be increased. That participation should not be limited to industry participants. Environmental NGOs as well as NGOs representing civil society at large must be afforded an opportunity to participate in ICAO processes.

Airlines have taken an admirable step by subscribing to IATA voluntary carbon offset program. IATA should continue to convince its member airlines, which have not done so, to subscribe to its offset program. In the case of States' failure to agree to a global market-based measure, continuation of such program with participation of all IATA member airlines can significantly reduce emissions from aviation. Since the IATA offset program is a voluntary program, significant participation of IATA member airlines in that scheme is uncertain. Hence, economically powerful States should adopt unilateral market-based measures of the same model, e.g., the EU ETS model, that will induce other States to follow suit.

At the global level, States are negotiating another binding agreement that is expected to be concluded at the end of 2015. Like its predecessor (the *Kyoto Protocol*), emissions from international civil aviation has been kept outside of the agreement's scope. Requiring States to

---

<sup>408</sup> These four criteria are: goal selection; goal reconciliation and coordination; implementation; and feedback and accountability. Among them, the first two criteria have been met in the aviation sector.

work through ICAO to reduce emissions from aviation is one way of acknowledging ICAO's leadership in the aviation sector. Now, it is ICAO's turn to utilize this opportunity by exerting its leadership role in aviation. ICAO Contracting States must assist ICAO in this endeavor.

## **Summary & Conclusions**

Climate change and global warming are happening and have become a global challenge. They are estimated to have caused over 150,000 deaths annually, and are expected to cause approximately 250,000 additional deaths per year between 2030 and 2050. Climate change will bring, and has already brought, about, among other things, increased frequency and severity of droughts, floods, hurricanes, and blizzards. Due to global warming, ice is melting worldwide, sea level rise has become faster over the last century, and precipitation (rain and snowfall) has increased across the globe, on average.

Aviation is a small but significant contributor to these environmental problems. It is a small contributor since it is responsible for approximately 2 percent of global carbon dioxide (CO<sub>2</sub>) emissions. However, it is a significant contributor since, if aviation sector were a State, the sector would be the 7<sup>th</sup> largest emitter of greenhouse gases and the 17<sup>th</sup> largest emitter of CO<sub>2</sub>. Due to aviation's significant contribution, it is essential to govern emissions from aviation. In other words, a successful climate change governance in international civil aviation is required. Additionally, several other factors necessitate immediate action from the air transport sector toward reducing such emissions. Those factors include: the rapid growth of aviation industry and aviation related activities outpacing technological reductions in emissions; the fact that aviation is the only human enterprise to emit pollutants directly into the upper troposphere and lower stratosphere; disruption of air transport services and facilities due to natural disasters caused by climate change that costs both the airlines and the passengers; the proverb "prevention is better than cure"; and the need to combat climate change and global warming globally, simultaneously, and collectively by all the sectors so that one sector's inaction do not frustrate efforts from other sectors.

The existing global climate change regime is composed of the *United Nations Framework Convention on Climate Change* and its *Kyoto Protocol*, which are jointly considered the backbone of the current climate change governance system at the global level. The regime is one of the newest features of international environmental law, which itself is relatively a new area in international law. As a new entrant, the regime does not encompass all the aspects surrounding climate change and global warming and, therefore, emissions from aviation have not been appropriately addressed in the regime, leaving the issue to the International Civil Aviation Organization [ICAO], the global forum of States for international civil aviation, for consideration. Since climate change and global warming are recent issues, they are not explicitly regulated by the

*Chicago Convention* concluded in 1944, which is the primary source of public international air law. However, the Convention tacitly confers an obligation on ICAO to address emissions from international civil aviation that contribute to those environmental problems. Thus, the Organization has a responsibility to govern emissions from international civil aviation. To ensure successful climate change governance in international civil aviation, ICAO has been working on aviation emissions, mainly aircraft engine emissions, for the last decade. In this respect, notable achievements of ICAO include: Annex 16, Volume II, to the *Chicago Convention* that addresses aircraft engine emissions (however, major greenhouse gases, e.g., CO<sub>2</sub>, water vapor (H<sub>2</sub>O), are not regulated, since Volume II was originally adopted to respond to concerns over air quality in the vicinity of airports); Assembly Resolutions dealing with climate change (the latest and effective one is Resolution A38-18); and a basket of mitigation measures to achieve ICAO's environmental goals (these measures include: three technical measures, namely, technology improvements, operational improvements, and sustainable alternative fuels, and one economic measure, namely, market-based measures).

The thesis has demonstrated that neither the existing and envisaged legal measures nor the basket of mitigation measures at their current state can effectively govern emissions from international civil aviation that contribute to climate change and global warming. No effective, binding legal measure is in place in the field of international civil aviation that addresses these environmental problems. ICAO's basket of mitigation measures is at its elementary stage and, unsurprisingly, is fraught with difficulties. Aerospace technology has not reached its required stage, and developments of such technologies are lengthy and expensive. Operational improvements cannot reduce emissions to the required level. Sustainable alternative fuels for aviation are still commercially unviable, and suffer from several production and deployment problems. Most importantly, no global market-based measure for international civil aviation is in place that can provide a meaningful, cost-effective, near-term solution. At the 38<sup>th</sup> Session of the ICAO Assembly, an agreement to develop a global market-based measure for international civil aviation has been reached that, if agreed-to at the 39<sup>th</sup> Session to be held in 2016, will become effective from 2020.

Due to the slow and unsatisfactory level of progress at ICAO, several unilateral measures have been adopted by States to govern aircraft engine emissions, which include the European Union Emissions Trading System [EU ETS] and taxes on departing air passengers. By reason of

its unilateral action, the EU has gained a first-mover advantage in international civil aviation by its ability to use its norms (namely, the necessity of reducing emissions from international civil aviation), to define the problem with emissions from aviation that contribute to climate change and global warming, and to propose a solution (namely, a global market-based measure for international civil aviation). For the same reason, States have shown up at the negotiating table at ICAO, are discussing the issue of aviation emissions more vehemently than before, and have reached an agreement to develop a global market-based measure for international civil aviation. Importantly, due to the EU ETS, ICAO has sped up its processes toward the reduction of emissions from international civil aviation.

Nonetheless, it has been demonstrated that the success of unilateral measures, like the EU ETS, in achieving their environmental goals is limited. Although unilateral environmental measures can produce new environmental norms, they frequently face protest from other States that often leads to trade wars and damages necessary multilateral efforts. Additionally, the scope, intensity, and geographic extent for the mitigation of emissions is lesser in the case of unilateral measures than it is in the case of multilateral measures. In the case of the EU ETS, the inclusion of aviation in the scheme has encountered objection from non-European Economic Area [EEA] States, giving rise to inter-State friction. It has thus been temporarily amended to limit its area of application to only within the EEA airspace. The importance of the retreat of the EU from its original proposal, due to intense political pressure from non-EEA economically powerful States, should not be underestimated. This will affect its role as norm entrepreneur in other sectors.

The thesis has shown that it is the ICAO Contracting States that are more responsible than the Organization for the slow and unsatisfactory level of progress at ICAO. In reality, differences between developed and developing States greatly contribute to that slow and unsatisfactory level of progress. The latest session of the ICAO Assembly, i.e. 38<sup>th</sup> Session, reveals that the disagreement between developed and developing States on certain issues is the principal reason why States are delaying to agree on any effective solution, particularly, a global market-based measure, for international civil aviation. These issues include: the representation of developing States in ICAO processes; the principle of common but differentiated responsibilities; the principle of special circumstances and respective capabilities; the concept of *de minimis* threshold granting exemption from any proposed national or regional market-based measure on routes to and from developing States, the share of international civil aviation activities of which are below a certain



threshold before the implementation of any global market-based measure; and ICAO's aspirational goal. In fact, such differences have made climate change governance at the global level, not only in the aviation sector, difficult.

States are well aware of the existence and dangers of climate change and global warming. They also acknowledge the necessity of immediate actions to reduce anthropogenic emissions that contribute to those processes. However, most States either are inactive or actively attempt to frustrate any progress in climate change negotiations. Their inactivity can be explained by the fact that States do not feel any real pressure from their citizens to take any action in this regard. Both States and their citizens are concerned with their short-term self-interest and, thus, are disinclined to adopt any necessary action to reverse the effects of climate change and global warming. Capitalism is mostly responsible for this motivation. However, due to the difficulty of rejecting capitalism altogether, several solutions, namely sustainable development, sustainable capitalism, and climate capitalism, have been suggested that do not discard but provide a new method of practicing capitalism. Market-based measures form part of these solutions.

This thesis suggests that binding legal measures, whether *de facto* or *de jure*, and a mandatory but temporary global market-based measure for international civil aviation are immediately required if States truly want to lessen the environmental footprints of international civil aviation. A new multilateral binding agreement, an amendment to *Chicago Convention*, a new Annex to the Convention, or an amendment to Annex 16 are all warranted means to reduce the climate change impact of international civil aviation. Since most mitigation measures, except market-based measures and, to some extent, operational opportunities, involve a time-consuming process, and since there is no possibility that climate change and global warming will regress soon, a global market-based measure for international civil aviation has to be developed and implemented without further delay. Market-based measures deserve priority, since these measures can supplement other measures and funds generated thereunder can be used to provide financial assistance to economically feeble States, which are incapable of taking initiatives toward reducing emissions from aviation. ICAO's assessment of three policy options for a global market-based measure for international civil aviation, namely, global mandatory offsetting, global mandatory offsetting with revenue, and global emissions trading, already demonstrated that these options were cost-effective and technically feasible, would have only marginal impacts on future growth, and could contribute to achieving ICAO's environmental goals. In this respect, States should not

strictly adhere to the archaic, though established, principles of non-discrimination and equality of opportunity. Instead, they must give way to emerging principles, e.g., the common but differentiated responsibilities principle with a new classification of States focused on the economical development of their airlines, for the purpose of international civil aviation. Any agreed-to global market-based measure should be adopted by way of a Standard. In this regard, a new Annex or an amendment to existing Annex 16 to the *Chicago Convention* can be adopted by the ICAO Council. The Council, which is authorized under Article 12 of the Convention to designate as mandatory over the high seas a number of international standards, should designate the Standard enforcing the global market-based measure as mandatory over the high seas. This would extend the geographic scope of the global measure.

Work on the technical measures in the basket, which can provide long-term, more effective solutions, should continue. The prevailing difficulties that affect the effectiveness of these mitigation measures have to be addressed and overcome on priority basis. States must give way to a new understanding of airspace sovereignty to increase the effectiveness of operational improvements in governing emissions. Such a new understanding is necessary to devise new operational measures to reduce emissions.

Nonetheless, it is challenging to employ these solutions globally due to the absence of any single global order, e.g., a world government. Since it is not possible to have a world government in current situation as well as in the foreseeable future, we need to resort to global governance in climate change – i.e. climate change governance at the global level – that can facilitate deployment of these solutions. In the case of aviation, recourse to climate change governance in international civil aviation has to be made. To ensure successful climate change governance, the following four criteria have to be met: goal selection; goal reconciliation and coordination; implementation; and feedback and accountability.

The thesis reveals that the first two criteria have been met in the aviation sector. However, the most critical phase, namely implementation, has yet to be achieved. ICAO's Committee on Aviation Environment Protection [CAEP] should recommend the adoption of a new Annex or an amendment to existing Annex 16 to give effect to any agreed-to global market-based measure. However, representation of developing States in ICAO's CAEP should be increased to secure more developing States' approval to CAEP recommendations toward reducing emissions from aviation. A new body has to be created within ICAO to discharge the Organization's responsibilities

concerning any global market-based measure. In any case, the supreme body of ICAO, the Assembly, must not wait for three years for another session to decide the fate of any market-based measure proposed by the ICAO Council. The Council should convene, if necessary, an extraordinary session of the Assembly to resolve the issue.

For feedback and accountability of market-based measures, NGO participation should be increased. That participation should not be limited to industry participants. Environmental NGOs as well as NGOs representing civil society at large must be afforded an opportunity to participate in ICAO processes.

In the absence of a global market-based measure, more airlines should subscribe to the voluntary carbon offset program of the International Air Transport Association [IATA]. IATA should continue to convince its member airlines, who have not done so, to subscribe to its offset program. In the case of States' failure to agree to a global market-based measure, continuation of such program with participation of all IATA member airlines can significantly reduce emissions from aviation.

The thesis has shown that multilateralism serves better than unilateralism in combating global problems like climate change and global warming. Hence, this thesis stresses the need for a well-designed, multilateral market-based measure, with extensive geographical coverage and a revenue generation scheme, for international civil aviation. Nonetheless, this thesis does not discard unilateral market-based measures, e.g., the EU ETS, as an effective solution to govern aircraft engine emissions. In fact, this thesis recommends that economically powerful States should adopt unilateral market-based measures of the same model, e.g., the EU ETS model, that will induce other States to follow suit. In this respect, it has to be underscored that, though the EU ETS cannot effectively diminish emissions from aviation, the scheme will cover 12.5 percent of emissions from international civil aviation. Thus, adoption of market-based measures of the same type by economically powerful States, in the absence of a global market-based measure, can significantly reduce emissions from aviation.

In the absence of a global measure, the lead that the EU has taken deserves admiration from an environmental perspective since it addresses a substantial amount of global emissions. Non-EEA States should not prohibit their flag carriers from complying with the EU ETS in its amended form (which does not have extra-territorial reach) and, the EU and its Member States must take necessary initiatives to conclude new or amend existing bilateral and/or multilateral agreements

with non-EEA States to give way to the application of the EU ETS to aircraft of non-EEA States. The EU has taken the lead; other economically powerful States should, utilizing their sovereign authority, step in to consolidate the global effort against climate change and global warming.

At the global level, States are negotiating another binding climate change agreement that is expected to be concluded at the end of 2015. However, like its predecessor, the *Kyoto Protocol*, emissions from international civil aviation has been kept outside of the agreement's scope. Requiring States to work through ICAO to reduce emissions from aviation is one way of acknowledging ICAO's leadership in the aviation sector. Now, it is ICAO's turn to utilize this opportunity by exerting its leadership role in aviation. ICAO Contracting States must assist ICAO in this endeavor.

## **Bibliography**

### INTERNATIONAL MATERIAL: TREATIES

- African Convention on the Conservation of Nature and Natural Resources*, 15 September 1968, 1001 UNTS 3.
- Consolidated version of the Treaty on European Union*, 7 February 1992, [2012] OJ, C 326/13.
- Consolidated version of the Treaty on the Functioning of the European Union*, 25 March 1957, [2012] OJ, C 326/47.
- Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific*, 12 November 1981, IELMT 981:85.
- Convention for the Unification of Certain Rules for International Carriage by Air*, 28 May 1999, 2242 UNTS 309, ICAO Doc 9740.
- Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79, Can TS 1993 No 24.
- Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295, Can TS 1944 No 36, ICAO Doc 7300/9.
- Convention on Long-Range Transboundary Air Pollution*, 13 November 1979, 1302 UNTS 217, Can TS 1983 No 34.
- Convention relating to the Regulation of Aerial Navigation*, 13 October 1919, 11 LNTS No 297 (not in force).
- Doha amendment to the Kyoto Protocol*, 8 December 2012, C.N.718.2012.TREATIES-XXVII.7.c, online: UN <[treaties.un.org/doc/Publication/CN/2012/CN.718.2012-Eng.pdf](http://treaties.un.org/doc/Publication/CN/2012/CN.718.2012-Eng.pdf)>.
- EC, *Charter of Fundamental Rights of the European Union*, 7 December 2000, [2012] OJ, C 326/391.
- EC, *Agreement on the European Economic Area*, [1994] OJ, L 1/3.
- International Air Transport Agreement*, 7 December 1944, 171 UNTS 387.
- International Convention for the Prevention of Pollution from Ships*, 2 November 1973, 1340 UNTS 184, UKTS 1983.
- International Plant Protection Convention*, 6 December 1951, 150 UNTS 67, Can TS 1953 No 16.
- Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 162.
- Montreal Protocol on Substances that Deplete the Ozone Layer*, 16 September 1987, 1522 UNTS 3, Can TS 1989 No 42.
- Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships*, 1973, 17 February 1978, 1340 UNTS 61.
- Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent*, 8 July 1985, 1480 UNTS 215.
- Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes*, 31 October 1988, 1593 UNTS 287.
- Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes*, 18 November 1991, 2001 UNTS 187.
- Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Further Reduction of Sulphur Emissions*, 14 June 1994, 2030 UNTS 122.
- Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent*

*Organic Pollutants*, 24 June 1998, 2230 UNTS 79.

*Protocol to the 1979 Convention on Long-range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone*, 30 November 1999, 2319 UNTS 81.

*Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, 5 August 1963, 480 UNTS 43, Can TS 1964 No 1.

*Treaty for Amazonian Co-operation*, 3 July 1978, 1202 UNTS 51.

*United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3, UKTS 1999 No 81.

*United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 UNTS 107, Can TS 1994 No 7 (entered into force 21 March 1994).

*Vienna Convention for the Protection of the Ozone Layer*, 22 March 1985, 1513 UNTS 293, Can TS 1988 No 23 (entered into force 22 September 1988).

*Vienna Convention on the Law of Treaties*, 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980).

#### LEGISLATION: FOREIGN

Austria, *Federal Act Introducing an Air Transport Levy (Air Transport Levy Act – FlugAbgG) Federal as amended by Tax Code Amendment Act 2012*, Law Gazette BGBl I No 112/2012, online: BMF: Federal Ministry of Finance <[www.bmf.gv.at/steuern/az/flugabgabegesetz/Air\\_Transport\\_Levy.pdf?3vgwui](http://www.bmf.gv.at/steuern/az/flugabgabegesetz/Air_Transport_Levy.pdf?3vgwui)>.

*European Union Emissions Trading Scheme Prohibition Act of 2011*, Pub L No 112–200, 126 Stat 1477.

*Finance Act 1994* (UK), c 9.

#### AIRPORT REGULATIONS

Aéroport International de Genève, “Airport charges and services” (last updated 24 March 2015), online: Genève Aéroport <[www.gva.ch/en/Portaldata/1/Resources/fichiers/institutionnels/tarifs/tarifs\\_GVA\\_en.pdf](http://www.gva.ch/en/Portaldata/1/Resources/fichiers/institutionnels/tarifs/tarifs_GVA_en.pdf)>.

Bern Airport, *Schedule of Fees & Charges* (valid as of 1 July 2014), online: Flughafen Bern <[www.flughafenbern.ch/images/content/pdf/JUL14Tarifordnung\\_en\\_GB.pdf](http://www.flughafenbern.ch/images/content/pdf/JUL14Tarifordnung_en_GB.pdf)>.

Copenhagen Airports, *Charges Regulations Applying to Copenhagen Airport: In Force during the Period 1 April 2015 to 31 March 2019* (1 April 2015), online: Copenhagen Airports <[www.cph.dk/en/about-cph/b2b/airline-sales/charges--slot/Copenhagen/](http://www.cph.dk/en/about-cph/b2b/airline-sales/charges--slot/Copenhagen/)>.

Düsseldorf Airport, *Tariff Regulations for Düsseldorf Airport* (valid from 1 January 2015), online: Düsseldorf Airport <[www.dus.com/~media/fdg/dus\\_com/businesspartner/aviation/entgelte/tariff\\_regulations\\_2015\\_02-02-2015.pdf](http://www.dus.com/~media/fdg/dus_com/businesspartner/aviation/entgelte/tariff_regulations_2015_02-02-2015.pdf)>.

EuroAirport: Basel-Mulhouse-Freiburg, *Tariff Regulations 2015*, ER-TRA-001 V14 (valid from 1 April 2015), online: EuroAirport <[www.euroairport.com/en/professionals/tariff-regulations.html](http://www.euroairport.com/en/professionals/tariff-regulations.html)>.

Gatwick Airport, *Gatwick Airport: Conditions of Use 2015/16* (effective from 1 April 2015), online: Gatwick Airport <[www.gatwickairport.com/globalassets/publicationfiles/business\\_and\\_community/all\\_](http://www.gatwickairport.com/globalassets/publicationfiles/business_and_community/all_)

public\_publications/2015/2015-16-conditions-of-use---clean-30jan15.pdf>.

Hamburg Airport, *Airport Charges: Part I* (effective 15 January 2015), online: Hamburg Airport <[www.hamburg-airport.de/media/Airport\\_Charges\\_Part\\_I\\_15-01-2015.pdf](http://www.hamburg-airport.de/media/Airport_Charges_Part_I_15-01-2015.pdf)>.

Heathrow Airport, *Schedule 5 – Charges effective from 1 July 2014*, online: Heathrow Airport <[www.heathrowairport.com/static/HeathrowAboutUs/Downloads/PDF/HAL-Conditions-of-Use-Amendment-SCHEDULE5-Up%20date-25April2014.pdf](http://www.heathrowairport.com/static/HeathrowAboutUs/Downloads/PDF/HAL-Conditions-of-Use-Amendment-SCHEDULE5-Up%20date-25April2014.pdf)>.

London Luton Airport, *Charges & Conditions of Use 2015/16* (effective from 1 April 2015).

LSZA – Lugano Airport – Aerodrome Charges: *Tariff Regulations at Lugano Airport* (19 September 2013), online: Lugano Airport <[www.lugano-airport.ch/files/documents/LS\\_GEN\\_4\\_1\\_EN\\_29\\_05\\_14.pdf](http://www.lugano-airport.ch/files/documents/LS_GEN_4_1_EN_29_05_14.pdf)>.

Munich Airport, *Tariff Regulations, Part 1* (effective from 1 January 2015), online: Munich Airport <[www.munich-airport.de/media/download/bereiche/aviation/charges2015.pdf](http://www.munich-airport.de/media/download/bereiche/aviation/charges2015.pdf)>.

Swedavia, *Airport Charges: Appendix 1 to Conditions of Services* (valid from 1 April 2015), online: Swedavia <[www.swedavia.com/Global/Swedavia/Flygmarknad/Prislista\\_exceeding5700kg\\_150401.pdf](http://www.swedavia.com/Global/Swedavia/Flygmarknad/Prislista_exceeding5700kg_150401.pdf)>.

#### INTERNATIONAL MATERIAL: OTHER DOCUMENTS

“Agenda 21” in *Report of the United Nations Conference on Environment and Development*, vol 1, Resolutions adopted by the Conference, Annex II, UN Doc A/CONF.151/26/Rev.1 (1993) 12, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=52](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=52)>.

*Amendments to the Annex of the Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto*, Resolution MEPC.203(62), IMO, 62th Sess, Annex 19 (2011) 1, online: IMO <[www.imo.org/en/MediaCentre/HotTopics/GHG/Documents/eedi%20amendments%20RESOLUTION%20MEPC203%2062.pdf](http://www.imo.org/en/MediaCentre/HotTopics/GHG/Documents/eedi%20amendments%20RESOLUTION%20MEPC203%2062.pdf)>.

Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, *Agenda item 4: Report of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol*, UNFCCC CMPOR, 8th Sess, Doc FCCC/KP/CMP/2012/L.9 (2012), online: UNFCCC <[unfccc.int/resource/docs/2012/cmp8/eng/109.pdf](http://unfccc.int/resource/docs/2012/cmp8/eng/109.pdf)>.

*Copenhagen Accord*, 18 December 2009, in UNFCCC, *Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009. Addendum. Part Two: Action taken by the Conference of the Parties at its fifteenth session*, UNFCCC Conference of the Parties, 15th Sess, Doc FCCC/CP/2009/11/Add.1 (2010), 4, online: UNFCCC <[unfccc.int/documentation/documents/advanced\\_search/items/6911.php?priref=600005735](http://unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600005735)>.

*Decision 27/CMP.1: Procedures and mechanisms relating to compliance under the Kyoto Protocol*, UNFCCC CMPOR, 1st Sess, Doc FCCC/KP/CMP/2005/8/Add.3 (2006) 92, online: UNFCCC <[unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf](http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf)>.

*Declaration of the United Nations Conference on the Human Environment*, 16 June 1972, 11 ILM 1416, online: UNEP <[www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503](http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503)>.

“Draft articles on prevention of transboundary harm from hazardous activities” in “Report of the

- Commission to the General Assembly on the work of its fifty-third session” (UN Doc A/56/10) in *Yearbook of the International Law Commission 2001*, vol 2, part 2 (New York: UN, 2007) (UNDOC. A/CN.4/SER.A/2001/Add.1 (Part 2)) 146.
- Further advancing the Durban Platform*, UNFCCC COP Dec 1/CP.19, in UNFCCC, *Report of the Conference of the Parties on its nineteenth session, held in Warsaw from 11 to 23 November 2013. Addendum. Part two: Action taken by the Conference of the Parties at its nineteenth session*, UNFCCC Conference of the Parties, 19th Sess, Doc FCCC/CP/2013/10/Add.1 (2014) 3, online: UNFCCC <[unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf](http://unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf)>.
- ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 37th Sess, Agenda Item 11(d), Paper No 1, Doc FCCC/SBSTA/2012/MISC.20 (15 November 2012) 3, online: UNFCCC <[unfccc.int/resource/docs/2012/sbsta/eng/misc20.pdf](http://unfccc.int/resource/docs/2012/sbsta/eng/misc20.pdf)>.
- ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 39th Sess, Agenda Item 11(f), Paper No 1, Doc FCCC/SBSTA/2013/MISC.20 (10 November 2013) 3, online: UNFCCC <[unfccc.int/resource/docs/2013/sbsta/eng/misc20.pdf](http://unfccc.int/resource/docs/2013/sbsta/eng/misc20.pdf)>.
- ICAO, *Emissions from fuel used for international aviation and maritime transport*, UNFCCC Subsidiary Body for Scientific and Technological Advice, 42nd Sess, Agenda Item 8(c), Paper No 1, Doc FCCC/SBSTA/2015/MISC.4 (27 May 2015) 3, online: UNFCCC <[unfccc.int/resource/docs/2015/sbsta/eng/misc04.pdf](http://unfccc.int/resource/docs/2015/sbsta/eng/misc04.pdf)>.
- International Law Commission, *First Report on the Protection of the Atmosphere*, UNGAOR, 2014, UN Doc A/CN.4/667.
- Joint Declaration of the Moscow Meeting on Inclusion of International Civil Aviation in the EU-ETS*, 22 February 2012, online: GREENAIR <[www.greenaironline.com/photos/Moscow\\_Declaration.pdf](http://www.greenaironline.com/photos/Moscow_Declaration.pdf)>.
- Lima Call for Climate Action*, UNFCCC COP Dec 1/CP.20 in UNFCCC, *Report of the Conference of the Parties on its twentieth session, held in Lima from 1 to 14 December 2014. Addendum. Part two: Action taken by the Conference of the Parties at its twentieth session*, UNFCCC Conference of the Parties, 20th Sess, Doc FCCC/CP/2014/10/Add.1 (2015) 2, online: UNFCCC <[unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf](http://unfccc.int/resource/docs/2014/cop20/eng/10a01.pdf)>.
- Principles Governing IPCC Work*, 1 October 1998 (approved at the Fourteenth Session (Vienna, 1–3 October 1998) on 1 October 1998, amended at the Twenty-First Session (Vienna, 3 and 6–7 November 2003), the Twenty-Fifth Session (Mauritius, 26–28 April 2006), the Thirty-Fifth Session (Geneva, 6–9 June 2012) and the Thirty-Seventh Session (Batumi, 14–18 October 2013)), online: IPCC <[www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf](http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf)>.
- “Report of the Commission to the General Assembly on the work of its fifty-third session” (UN Doc A/56/10) in *Yearbook of the International Law Commission 2001*, vol 2, part 2 (New York: UN, 2007) (UNDOC. A/CN.4/SER.A/2001/Add.1 (Part 2)).
- Resolution on the Implementation of the Aviation “CNG2020” Strategy*, International Air Transport Association Annual General Meeting, 69th Sess (2013), online: IATA <[www.iata.org/pressroom/pr/Documents/agm69-resolution-cng2020.pdf](http://www.iata.org/pressroom/pr/Documents/agm69-resolution-cng2020.pdf)>.
- Rio Declaration on Environment and Development*, UN Doc A/CONF.151/5/Rev.1 (1992), 31 ILM 874, online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163](http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163)>.
- UNEP, *Handbook for the Vienna Convention for the Protection of the Ozone Layer (1985)*, 9th ed



- (Nairobi: UNEP Secretariat for the Vienna Convention for the Protection of the Ozone Layer & the Montreal Protocol on Substances that Deplete the Ozone Layer, 2012).
- UNEP, *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer*, 9th ed (Nairobi: UNEP Secretariat for the Vienna Convention for the Protection of the Ozone Layer & the Montreal Protocol on Substances that Deplete the Ozone Layer, 2012).
- UNFCCC, *Negotiating text* (advance unedited version 12 February 2015), Work of the Contact Group on Item 3, Ad Hoc Working Group on the Durban Platform For Enhanced Action, 2nd Sess, Part 8 (2015), online: UNFCCC <[unfccc.int/files/bodies/awg/application/pdf/negotiating\\_text\\_12022015@2200.pdf](http://unfccc.int/files/bodies/awg/application/pdf/negotiating_text_12022015@2200.pdf)> (visited August 20, 2015).
- U.S.-China Joint Announcement on Climate Change, 12 November 2014, online: The White House <[www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change](http://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change)>.

#### INTERNATIONAL MATERIAL: INTERNATIONAL CIVIL AVIATION ORGANIZATION DOCUMENTS

- 54 African States, *Position of African States on Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 272, Doc A38-WP/272/Ex/92 (11 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp272\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp272_en.pdf)>.
- Afghanistan, *Afghanistan's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Afghanistan\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Afghanistan_en.pdf)>.
- Airports Council International et al, *Addressing CO<sub>2</sub> Emissions from Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 68, Doc A38-WP/68/Revision no 3/Ex/33 (17 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp068\\_rev3\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp068_rev3_en.pdf)>.
- Argentina et al, *Inclusion of International Civil Aviation in the European Union Emissions Trading Scheme (EU ETS) and its Impact*, ICAO Council, 194th Sess, Subject No 50, Working Paper Doc C-WP/13790 (2011).
- Argentina et al, *Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 424, Doc A38-WP/424/Ex/139 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp424\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp424_en.pdf)>.
- Argentina et al, *Proposed Amendments for the Draft Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 425, Doc A38-WP/425/Ex/140 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp425\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp425_en.pdf)>.
- Argentina et al, *Proposed Amendments for the Draft Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 432, Doc A38-WP/432/Ex/144 (1 October 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp432\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp432_en.pdf)>.
- Aruba et al, *Civil Aviation Developments in Latin America in Support of Air Transport Sustainability in the Region*, ICAO Assembly, 38th Sess, Agenda Item 17, Working

- Paper No 317, Doc A38-WP/317/Ex/109 (10 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp317\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp317_en.pdf)>.
- Australia, *Reservation by Australia to Resolution A38/17/2 on international aviation and climate change*, Reference: ENV 2/1 (5 November 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Australia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Australia_en.pdf)>.
- Bahrain, *Bahrain's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Bahrain\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Bahrain_en.pdf)>.
- Belgium, *Written Statement of Reservation by Belgium on behalf of the European Union (EU), its 27 Member States, and the 17 Other States Members of the European Civil Aviation Conference (ECAC) on Resolution A37-17/2: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: European Commission <[ec.europa.eu/clima/policies/transport/aviation/docs/reservations\\_201010\\_en.pdf](http://ec.europa.eu/clima/policies/transport/aviation/docs/reservations_201010_en.pdf)>.
- Brazil on behalf of Argentina, Cuba and Venezuela, Letter Nr.: 416 / BRASICAO, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Brazil\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Brazil_en.pdf)>.
- Canada, *Statement of Canada's Reservations Regarding the 38<sup>th</sup> International Civil Aviation Organization General Assembly Resolution: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Canada\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Canada_en.pdf)>.
- China, *Statement of Reservation of China regarding Resolution 17/2 of the 38th Session of the Assembly: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/China\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/China_en.pdf)>.
- Civil Air Navigation Services Organisation (CANSO), *Air Space Sovereignty*, ICAO Worldwide Air Transport Conference (ATCONF), 6th Mtg, Agenda Items 1, 1.1, Working Paper, Doc ATConf/6-WP/80 (4 March 2013), online: ICAO <[www.icao.int/Meetings/atconf6/Documents/WorkingPapers/ATConf.6.WP.080.1.en.pdf](http://www.icao.int/Meetings/atconf6/Documents/WorkingPapers/ATConf.6.WP.080.1.en.pdf)>.
- Consolidated statement of continuing ICAO policies and practices related to environmental protection*, ICAO Assembly Res A35-5, 35th Sess, ICAO Doc 9848, I-37, online: ICAO <[www.icao.int/publications/Documents/9848\\_en.pdf](http://www.icao.int/publications/Documents/9848_en.pdf)>.
- Consolidated statement of continuing ICAO policies and practices related to environmental protection*, ICAO Assembly Res A36-22, 36th Sess, ICAO Doc 9902, I-54, online: ICAO <[www.icao.int/publications/Documents/9902\\_en.pdf](http://www.icao.int/publications/Documents/9902_en.pdf)>.
- Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A37-19, 37th Sess, ICAO Doc 9958, I-67, online: ICAO <[www.icao.int/publications/Documents/9958\\_en.pdf](http://www.icao.int/publications/Documents/9958_en.pdf)>.
- Consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation*, ICAO Assembly Res A38-12, 38th Sess, ICAO Doc 10022, II-5, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)>.
- Consolidated statement of continuing ICAO policies in the air transport field*, ICAO Assembly Res A38-14, 38th Sess, ICAO Doc 10022, III-1, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)>.
- Consolidated statement of continuing ICAO policies and practices related to environmental*

- protection – General provisions, noise and local air quality*, ICAO Assembly Res A38-17, 38th Sess, ICAO Doc 10022, I-54, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)>.
- Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, ICAO Assembly Res A38-18, 38th Sess, ICAO Doc 10022, I-68, online: ICAO <[www.icao.int/publications/Documents/10022\\_en.pdf](http://www.icao.int/publications/Documents/10022_en.pdf)>.
- Cuba, OR: CUB-13-126, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Cuba\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Cuba_en.pdf)>.
- Declaration by the High-level Meeting on International Aviation and Climate Change (HLM-ENV/09) in October 2009*, in ICAO, “Climate Change: Programme of Action”, online: ICAO <[www.icao.int/environmental-protection/Pages/programme-of-action.aspx](http://www.icao.int/environmental-protection/Pages/programme-of-action.aspx)>.
- ICAO, *The Convention on International Civil Aviation: Annexes 1 to 18*, online: ICAO <[www.icao.int/safety/airnavigation/NationalityMarks/annexes\\_booklet\\_en.pdf](http://www.icao.int/safety/airnavigation/NationalityMarks/annexes_booklet_en.pdf)>.
- ICAO, (2001) 13 International Standards and Recommended Practices: Annex 11 to the Convention on International Civil Aviation: Air Traffic services: Air Traffic Control Service: Flight Information Service: Alerting Service.
- ICAO, (2005) 10 International Standards: Annex 2 to the Convention on International Civil Aviation: Rules of the Air.
- ICAO, (2008) 3 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 2, Aircraft Engine Emissions.
- ICAO, “Supplement to Annex 16, Volume II (Second Edition)” in ICAO, (2008) 3 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 2, Aircraft Engine Emissions.
- ICAO, (2014) 7 International Standards and Recommended Practices: Annex 16 to the Convention on International Civil Aviation: Volume 1, Aircraft Noise.
- ICAO, *Performance-based Navigation (PBN) Manual*, 3rd ed, ICAO Doc 9613/AN/937 (Montreal: ICAO, 2008).
- ICAO, *Airport Air Quality Manual*, 1st ed, ICAO Doc 9889 (2011), online: ICAO <[www.icao.int/publications/Documents/9889\\_cons\\_en.pdf](http://www.icao.int/publications/Documents/9889_cons_en.pdf)>.
- ICAO, *Environment: Market-based Measures and Climate Change* (August 2013), online: ICAO <[cfapp.icao.int/tools/38thAssyikit/story\\_content/external\\_files/Flyer\\_US-Letter\\_ENV\\_MBM\\_s\\_2013-08-30.pdf](http://cfapp.icao.int/tools/38thAssyikit/story_content/external_files/Flyer_US-Letter_ENV_MBM_s_2013-08-30.pdf)>.
- ICAO, *Global Air Navigation Plan*, 4th ed, ICAO Doc 9750-AN/963 (Montreal: ICAO, 2013), online: ICAO <[www.icao.int/publications/Documents/9750\\_4ed\\_en.pdf](http://www.icao.int/publications/Documents/9750_4ed_en.pdf)>.
- ICAO, *Report of the Assessment of Market-based Measures*, 1st ed, ICAO Doc 10018 (2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/10018\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/10018_en.pdf)>.
- ICAO, *Assembly Resolutions in Force (as of 4 October 2013)*, ICAO Doc 10022 (2014), online: ICAO <[www.icao.int/publications/pages/publication.aspx?docnum=10022](http://www.icao.int/publications/pages/publication.aspx?docnum=10022)>.
- ICAO, *Operational Opportunities to Reduce Fuel Burn and Emissions*, Circular 303-AN/176, ICAO Doc 10013 (2014).
- ICAO, *ICAO Carbon Emissions Calculator Methodology*, 7th version (June 2014), online: ICAO <[www.icao.int/environmental-protection/CarbonOffset/Documents/Methodology%20ICAO%20Carbon%20Calculator\\_v7-2014.pdf](http://www.icao.int/environmental-protection/CarbonOffset/Documents/Methodology%20ICAO%20Carbon%20Calculator_v7-2014.pdf)>.
- ICAO, *Structure of ICAO Secretariat*, 1 June 2014 (Revision No 1), online: ICAO <[www.icao.int/secretariat/Documents/Organigramme\\_en.pdf](http://www.icao.int/secretariat/Documents/Organigramme_en.pdf)>.

- ICAO Council, *Annual Report 2014: Strategic Objectives: Environmental Protection*, online: ICAO <[www.icao.int/annual-report-2014/Pages/progress-on-icaos-strategic-objectives-safety-environmental-protection-cooperation-with-other-un-bodies.aspx](http://www.icao.int/annual-report-2014/Pages/progress-on-icaos-strategic-objectives-safety-environmental-protection-cooperation-with-other-un-bodies.aspx)>.
- ICAO, *Statement by the International Civil Aviation Organization (ICAO), to the Forty-second Session of the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA42)* (2015), online: UNFCCC <[unfccc.int/files/bodies/sbsta/application/pdf/sbsta42\\_icao\\_statement\\_ver06.pdf](http://unfccc.int/files/bodies/sbsta/application/pdf/sbsta42_icao_statement_ver06.pdf)>.
- ICAO Council, *Environmental Protection – Developments in other United Nations Bodies and International Organizations*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 32, Doc A38-WP/32/Ex/27 (18 July 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp032\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp032_en.pdf)>.
- ICAO Council, *Market-Based Measures (MBMs)*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 29, Doc A38-WP/29/Ex/24 (4 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp029\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp029_en.pdf)>.
- India, *India's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/India\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/India_en.pdf)>.
- International Coalition for Sustainable Aviation, *Effective Market-Based Measures to Address Greenhouse Gas Emissions from International Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 288, Doc A38-WP/288/Ex/100 (12 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp288\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp288_en.pdf)>.
- Japan, *Japan's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Japan\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Japan_en.pdf)>.
- Kingdom of Saudi Arabia, *Expectations and Desirable Objectives of the 38th Session of the Assembly relating to International Aviation and Climate Change – Perspective of the Kingdom of Saudi Arabia*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 176, Doc A38-WP/176/Ex/67 (20 August 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp176\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp176_en.pdf)>.
- Kingdom of Saudi Arabia, *Saudi Arabia's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Saudi\\_Arabia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Saudi_Arabia_en.pdf)>.
- Lithuania, *A Comprehensive Approach to Reducing the Climate Impacts of International Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 83, Doc A38-WP/83/Ex/38 (31 July 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp083\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp083_en.pdf)>.
- Lithuania, *Written Statement of Reservation by Lithuania on behalf of the Member States of the European Union and 14 other Member States of the European Civil Aviation Conference (ECAC) with regard to ICAO Assembly Resolution A38-18*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Lithuania_en.pdf)>.
- New Zealand, *New Zealand's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO

- <[www.icao.int/Meetings/a38/Documents/Resolutions/New\\_Zealand\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/New_Zealand_en.pdf)>.
- Nicaragua, NIC-ICAO-005/2013, online: ICAO  
<[www.icao.int/Meetings/a38/Documents/Resolutions/Nicaragua\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Nicaragua_en.pdf)>.
- Qatar, *Qatar's Reservation regarding Assembly Resolution A38-18: Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection – Climate Change*, online: ICAO  
<[www.icao.int/Meetings/a38/Documents/Resolutions/Qatar\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Qatar_en.pdf)>.
- Republic of Korea, *Statement of Reservation of the Republic of Korea Regarding Resolution A38-17/2: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate Change* (22 October 2013), online: ICAO  
<[www.icao.int/Meetings/a38/Documents/Resolutions/Korea\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Korea_en.pdf)>.
- Russian Federation, *Market-Based Measures as the Factor of an Increase of Greenhouse Gas Emissions in the Sector of International Civil Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 250, Doc A38-WP/250/Ex/83 (20 August 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp250\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp250_en.pdf)>.
- Russian Federation, *Proposed Improvements for the Draft Consolidated Statement of Continuing ICAO Policies and Practices related to Environmental Protection - Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 275, Doc A38-WP/275/Ex/94 (10 September 2013), online: ICAO  
<[www.icao.int/Meetings/a38/Documents/WP/wp275\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp275_en.pdf)>.
- Russian Federation, *Statement from the Delegation of the Russian Federation: Re: Report on Agenda Item 17 for the 38th ICAO Assembly (Climate Change section)*, online: ICAO  
<[www.icao.int/Meetings/a38/Documents/Resolutions/Russia\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Russia_en.pdf)>.
- Singapore, *Statement of Reservation of the Republic of Singapore on the 38<sup>th</sup> ICAO Assembly Resolution A38-17/2: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO  
<[www.icao.int/Meetings/a38/Documents/Resolutions/Singapore\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Singapore_en.pdf)>.
- United Arab Emirates, *UAE's Views on Aviation and Climate Change*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 258, Doc A38-WP/258/Ex/85 (9 September 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp258\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp258_en.pdf)>.
- United Arab Emirates, *UAE Reservation – Resolution 17/2 Environmental Protection – Climate Change* (4 October 2013), online: ICAO  
<[www.icao.int/Meetings/a38/Documents/Resolutions/UAE\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/UAE_en.pdf)>.
- United States, *Addressing the Climate Impacts of Aviation*, ICAO Assembly, 38th Sess, Agenda Item 17, Working Paper No 234, Doc A38-WP/234/Ex/79 (20 August 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/WP/wp234\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/WP/wp234_en.pdf)>.
- United States, *Statement of Reservation of the United States of America regarding the 38<sup>th</sup> ICAO Assembly Resolution: Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection – Climate Change*, online: ICAO <[www.icao.int/Meetings/a38/Documents/Resolutions/United\\_States\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/United_States_en.pdf)> [United States, *Statement of Reservation*].
- Venezuela, online: ICAO  
<[www.icao.int/Meetings/a38/Documents/Resolutions/Venezuela\\_en.pdf](http://www.icao.int/Meetings/a38/Documents/Resolutions/Venezuela_en.pdf)>.

#### INTERNATIONAL MATERIAL: EUROPEAN UNION DOCUMENTS

EC, Commission, *Communication from the Commission to the Council, the European Parliament,*

- the European Economic and Social Committee and the Committee of the Regions: Reducing the Climate Change Impact of Aviation*, COM(2005) 459 final (Brussels: EC, 2005), online: EUR-Lex <eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0459:FIN:EN:PDF>.
- EC, Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Mainstreaming Sustainable Development into EU Policies: 2009 Review of the European Union Strategy for Sustainable Development*, COM(2009) 400 final (Brussels: EC, 2009), online: EUR-Lex <eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009DC0400&from=EN>.
- EC, Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Integrating maritime transport emissions in the EU's greenhouse gas reduction policies*, COM(2013) 479 final, (Brussels: EC, 2013), online: European Commission <ec.europa.eu/clima/policies/transport/shipping/docs/com\_2013\_479\_en.pdf>.
- EC, Commission, *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, COM(2006) 818 final – 2006/0304 (COD) (Brussels: EC, 2006), online: EUR-Lex <eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52006PC0818>.
- EC, Commission, *Proposal for a Regulation of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport and amending Regulation (EU) No 525/2013*, COM(2013) 480 final – 2013/0224 (COD) (Brussels: EC, 2013), online: European Commission <ec.europa.eu/clima/policies/transport/shipping/docs/com\_2013\_480\_en.pdf>.
- EC, *Commission Regulation (EU) 421/2014 of the European Parliament and of the Council of 16 April 2014 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions*, [2014] OJ, L 129/1.
- EC, *Commission Staff Working Document: Accompanying document to the Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community: Impact Assessment of the inclusion of aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, SEC(2006) 1684 (Brussels: EC, 2006), online: European Commission <ec.europa.eu/clima/policies/transport/aviation/docs/sec\_2006\_1684\_en.pdf>.
- EC, Commission, *Commission Staff Working Document: Impact Assessment Accompanying the Document Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowances trading within the Community, in view of the implementation by 2020 of an international agreement applying a single global market-based measure to international aviation emissions*, SWD(2013) 430 final (Brussels: EC, 2013), online: European Commission <ec.europa.eu/clima/policies/transport/aviation/docs/swd\_2013\_430\_en.pdf>.
- EC, Commission, *Frequently Asked Questions: 2013-2016 Regulation amending the EU*

*Emissions Trading System for aviation* (Brussels: EC, 2014), online: European Commission <[ec.europa.eu/clima/policies/transport/aviation/docs/faq\\_aviation\\_2013-2016\\_en.pdf](http://ec.europa.eu/clima/policies/transport/aviation/docs/faq_aviation_2013-2016_en.pdf)>.

- EC, *Council Decision 94/69/EC of 15 December 1993 concerning the conclusion of the United Nations Framework Convention on Climate Change*, [1994] OJ, L 33/11.
- EC, *Council Decision 2002/358/CE of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder*, [2002] OJ, L 130/1.
- EC, *Council Regulation (EC) 925/1999 of 29 April 1999 on the registration and operation within the Community of certain types of civil subsonic jet aeroplanes which have been modified and recertificated as meeting the standards of volume I, Part II, Chapter 3 of Annex 16 to the Convention on International Civil Aviation, third edition (July 1993)*, [1999] OJ, L 115/1.
- EC, *Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme*, [2002] OJ, L 242/1.
- EC, *Decision of the EEA Joint Committee No 146/2007 of 26 October 2007 amending Annex XX (Environment) to the EEA Agreement*, [2008] OJ, L 100/92.
- EC, *Decision of the EEA Joint Committee No 6/2011 of 1 April 2011 amending Annex XX (Environment) to the EEA Agreement*, [2011] OJ, L 93/35.
- EC, *Decision 377/2013/EU of the European Parliament and of the Council of 24 April 2013 derogating temporarily from Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community*, [2013] OJ, L 113/1.
- EC, *Directive 2002/30/EC of the European Parliament and of the Council of 26 March 2002 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community airports*, [2002] OJ, L 85/40.
- EC, *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC*, [2003] OJ, L 275/32.
- EC, *Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, [2009] OJ, L 8/3.
- EC, *Regulation (EC) No 261/2004 of the European Parliament and of the Council of 11 February 2004 establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, and repealing Regulation (EEC) No 295/91*, [2004] OJ, L 46/1.

#### GOVERNMENT DOCUMENTS: FOREIGN

Italy, Ministero dell' Ambiente e della tutela del territorio e del mare, *Il Comitato nazionale per la gestione della Direttiva 2003/87/CE e per il supporto nella gestione delle attività di progetto del Protocollo di Kyoto*, online: Ministero dell' Ambiente e della tutela del territorio e del mare <[www.minambiente.it/sites/default/files/archivio/allegati/emission\\_trading/comunicato\\_operatori\\_aerei\\_sanzione\\_rev2.pdf](http://www.minambiente.it/sites/default/files/archivio/allegati/emission_trading/comunicato_operatori_aerei_sanzione_rev2.pdf)>.

UK, Department of Energy & Climate Change, *Implementing the Aviation EU Emissions Trading System Regulation (421/2014) in UK Regulations* (Consultation Response Document,

URN 14D/423) (London, UK: Department of Energy & Climate Change, 2014), online: GOV.UK

<[www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/377689/Government\\_response\\_to\\_consultation\\_on\\_Greenhouse\\_Gas\\_Emissions\\_Trading\\_Scheme\\_Regulations\\_\\_Amendments\\_\\_2014.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/377689/Government_response_to_consultation_on_Greenhouse_Gas_Emissions_Trading_Scheme_Regulations__Amendments__2014.pdf)>.

UK Environment Agency, *Transparency data: EU ETS civil penalties: aviation* (12 June 2015), online: GOV.UK <[www.gov.uk/government/publications/climate-change-regimes-civil-penalties-imposed/eu-ets-civil-penalties-aviation](http://www.gov.uk/government/publications/climate-change-regimes-civil-penalties-imposed/eu-ets-civil-penalties-aviation)>.

#### JURISPRUDENCE: INTERNATIONAL COURT/TRIBUNAL

*Air Transport Association of America and others v Secretary of State for Energy and Climate Change*, C-366/10, [2011] ECR I-13833.

*Air Transport Association of America and others v Secretary of State for Energy and Climate Change*, C-366/10, Advocate General's Opinion, [2011] ECR I-13765.

*Award in the Arbitration regarding the Iron Rhine Railway (Belgium v Netherlands)* (2005), ICGJ 373 (Permanent Court of Arbitration).

*Case concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v Singapore)*, Case No 12, Provisional Measures (8 October 2003) (International Tribunal for the Law of the Sea).

*Case concerning Military and Paramilitary activities in and against Nicaragua (Nicaragua v United States of America)*, [1986] ICJ Rep 14.

*Case concerning Pulp Mills on the River Uruguay (Argentina v Uruguay)*, [2010] ICJ Rep 14.

*Case concerning the Gabčíkovo-Nagymaros Project (Hungary v Slovakia)*, [1997] ICJ Rep 7.

*Competence of the International Labour Organization to Regulate, Incidentally, the Personal Work of the Employer* (1926), Advisory Opinion, PCIJ (Ser B) No 13.

*Lac Lanoux Arbitration (France v Spain)* (1957), 12 RIAA 281, 24 ILR 101 (Arbitral Tribunal).

*Legality of the Threat or Use of Nuclear Weapons Case*, Advisory Opinion, [1996] ICJ Rep 226.

*Legality of the Use by a State of Nuclear Weapons in Armed Conflict*, Advisory Opinion, [1996] ICJ Rep 66.

*MOX Plant Case (Ireland v United Kingdom)*, Case No 10, Provisional Measures (3 December 2001) (International Tribunal for the Law of the Sea).

*North Sea Continental Shelf Cases (Federal Republic of Germany v Denmark; Federal Republic of Germany v Netherlands)*, [1969] ICJ Rep 3.

*Reparation for Injuries Suffered in the Service of the United Nations*, Advisory Opinion, [1949] ICJ Rep 174.

*The Case of the SS "Lotus" (France v Turkey)* (1927), PCIJ (Ser A) No 10.

*The Corfu Channel Case*, [1949] ICJ Rep 4.

*The Island of Palmas Case (or Miangas) (United States v Netherlands)* (1928), 11 RIAA 829 (Permanent Court of Arbitration) (Arbitrator: M Huber).

*Trail Smelter Arbitration (United States v Canada)* (1938), 3 RIAA 1905, reprinted in 33 AJIL 182 (Arbitrators: Charles Warren, Robert AE Greenshields, Jan Frans Hostie).

*United States – Import Prohibition of Certain Shrimp and Shrimp Products – Recourse to Article 21.5 of the DSU by Malaysia (Complaint by Malaysia, India, Pakistan, Thailand)* (2001), WTO Doc WT/DS58/AB/RW (Appellate Body Report), online: WTO <[docs.wto.org/dol2fe/Pages/FE\\_Search/FE\\_S\\_S006.aspx?Query=%28@Symbol=%20wt/ds58/ab/rw\\*%20not%20rw2\\*%29&Language=ENGLISH&Context=FomerScripted](http://docs.wto.org/dol2fe/Pages/FE_Search/FE_S_S006.aspx?Query=%28@Symbol=%20wt/ds58/ab/rw*%20not%20rw2*%29&Language=ENGLISH&Context=FomerScripted)>



JURISPRUDENCE: FOREIGN

*New Zealand Airline Pilots' Association v Attorney General*, [1997] 3 NZLR 269 (CA).

SECONDARY MATERIAL: MONOGRAPHS

- Abeyratne, Ruwantissa. *Convention on International Civil Aviation: A Commentary* (London, UK: Springer International, 2014).
- Air Transport Action Group, *Beginner's Guide to Aviation Biofuels* (Geneva, ATAG, 2009), online: National Center for Food and Agricultural Policy <[www.ncfap.org/documents/biofuels\\_aviation/BeginnersGuide\\_Biofuels\\_WebRes.pdf](http://www.ncfap.org/documents/biofuels_aviation/BeginnersGuide_Biofuels_WebRes.pdf)>.
- . *Beginner's Guide to Aviation Biofuels*, 2nd ed (Geneva: ATAG, 2011).
- Akhtarkhavari, Afshin. *Global Governance of the Environment: Environmental Principles and Change in International Law and Politics* (Cheltenham, UK: Edward Elgar, 2010).
- Armstrong, David ed, *Routledge Handbook of International Law* (Oxford: Routledge, 2009).
- Aust, Anthony. *Handbook of International Law*, 2nd ed (New York: Cambridge University Press, 2010).
- Axelrod, Robert M. *The Evolution of Cooperation* (New York: Basic Books, 1984).
- Baker, Susan. *Sustainable Development* (New York: Routledge, 2006).
- Bevir, Mark ed, *The SAGE Handbook of Governance* (London, UK: SAGE Publications, 2011).
- Birnie, Patricia; Alan Boyle & Catherine Redgwell, *International Law and the Environment*, 3rd ed (New York: Oxford University Press, 2009).
- Bodansky, Daniel; Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007).
- Bodin, Jean. *Les six livres de la république*, 4th ed (Paris: Chez Jacques du Puys, 1576).
- Boyd, Emily & Emma L Tompkins, *Climate Change: A Beginner's Guide* (Oxford: Oneworld Publications, 2009).
- Brownlie, Ian. *Principles of Public International Law*, 7th ed (New York: Oxford University Press, 2008).
- Buergenthal, Thomas. *Law-Making in the International Civil Aviation Organization* in Richard B Lillich, ed, *Procedural Aspects of International Law Series*, vol 7 (New York: Syracuse University Press, 1969).
- Dauvergne, Peter ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012).
- de Waart, PJIM; Paul Peters & Erik Denters, eds, *International Law and Development* (Dordrecht: Martinus Nijhoff, 1988).
- Dempsey, Paul Stephen. *Public International Air Law* (Montreal: McGill University, Institute and Center for Research in Air & Space Law, 2008).
- . & Laurence E Gesell, *Airline Management: Strategies for the 21st Century*, 2nd ed (Chandler, Ariz: Coast Aire Publications, 2006).
- Dreyfus, Hubert & Paul Rabinow, eds, *Michel Foucault: Beyond Structuralism and Hermeneutics*, 2nd ed (Chicago: University of Chicago Press, 1983).
- Dryzek, John S; Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011).

- Edenhofer, Ottmar *et al*, eds, *Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014).
- Eggleston, Simon *et al*, eds, *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (Hayama, Japan: Institute for Global Environmental Strategies, 2006).
- Elliott, Lorraine. *The Global Politics of the Environment*, 2nd ed (New York: New York University Press, 2004).
- Evans, Malcolm D ed, *International Law*, 2nd ed (Oxford: Oxford University Press, 2006).
- , ed, *International Law*, 3rd ed (New York: Oxford University Press, 2010).
- Falkner, Robert ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013).
- Field, Christopher B *et al*, eds, *Climate Change 2014: Impacts, Adaptation, and Vulnerability: Part A: Global and Sectoral Aspects: Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014).
- Fitzmaurice, Malgosia; David M Ong & Panos Merkouris, eds, *Research Handbook on International Environmental Law* (Cheltenham, UK: Edward Elgar, 2010).
- Foster, John Bellamy; Brett Clark & Richard York, *The Ecological Rift: Capitalism's War on the Earth* (New York: Monthly Review Press, 2010).
- Freestone, David & Charlotte Steck eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and Beyond* (Oxford: Oxford University Press, 2009).
- Gerrard, Michael B & Gregory E Wannier, eds, *Threatened Island Nations: Legal Implications of Rising Seas and a Changing Climate* (New York: Cambridge University Press, 2013).
- Giemulla, Elmar M & Ludwig Weber, eds, *International and EU Aviation Law: Selected Issues* (AH Alphen aan den Rijn: Kluwer Law International, 2011).
- Gupta, Joyeeta. "On Behalf of My Delegation,...": *A Survival Guide for Developing Country Climate Negotiators* (Washington DC: Center for Sustainable Development of the Americas & International Institute for Sustainable Development, 2000).
- Hanqin, Xue. *Transboundary Damage in International Law* (New York: Cambridge University Press, 2003).
- Harris, Paul G *What's Wrong with Climate Politics and How to Fix It* (Cambridge: Polity Press, 2013).
- , ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014).
- Harrison, Neil E. *Sustainable Capitalism and the Pursuit of Well-Being* (New York: Routledge, 2014).
- Held, David. Angus Fane-Hervey & Marika Theros, eds, *The Governance of Climate Change: Science, Economics, Politics and Ethics* (Cambridge: Polity Press, 2011).
- Helm, Dieter & Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009).
- Houghton, JT *et al*, eds, *Climate Change 2001: The Scientific Basis: Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2011).
- Hunter, David. James Salzman & Durwood Zaelke, *International Environmental Law and Policy*, 4th ed (New York: Thomson Reuters/Foundation Press, 2011).
- ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010).
- , *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013).

- Ikerd, John. *Sustainable Capitalism: A Matter of Common Sense* (Bloomfield, Conn: Kumarian Press, 2005).
- Jackson, Robert. *Sovereignty* (Cambridge: Polity Press, 2007).
- Janis, Mark Weston. *International Law*, 6th ed (New York: Wolters Kluwer Law & Business, 2012).
- Jennings, Sir Robert & Sir Arthur Watts, eds, *Oppenheim's International Law*, 9th ed (Harlow, Essex: Longman, 1992) vol 1.
- Kaczorowska, Alina. *Public International Law*, 4th ed (Oxford: Routledge, 2010).
- Kelsen, Hans. *Principles of International Law* (New York: Rinehart, 1952).
- Kiss, Alexandre & Dinah Shelton, *International Environmental Law*, 3rd ed (New York: Transnational, 2004).
- Levi-Faur, David ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012).
- Lloyd, WF. *Two Lectures On the Checks to Population, delivered before the University of Oxford, in Michaelmas Term 1832* (Oxford: S Collingwood, 1833).
- Lovins, L Hunter & Boyd Cohen, *Climate Capitalism: Capitalism in the Age of Climate Change*, 1st ed (New York: Hill and Wang, 2011).
- Marsden, William. *Fools Rule: Inside the Failed Politics of Climate Change* (Toronto: Alfred A Knopf Canada, 2011).
- Martella, Roger R & J Brett Grosko, eds, *International Environmental Law: The Practitioner's Guide to the Laws of the Planet* (Chicago: American Bar Association, 2014).
- Matte, Nicolas Mateesco. *Treatise on Air-Aeronautical Law* (Montreal: ICASL, McGill University, 1981).
- McCormick, John. *The European Union: Politics and Policies*, 2nd ed (Boulder, Colo: Westview Press, 1999).
- Merchant, Carolyn. *Ecology*, 2nd ed (Amherst, NY: Humanity Books, 2008).
- Metz, Bert *et al*, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007).
- Milde, Michael. *International Air Law and ICAO* in Marietta Benkö, ed, *Essential Air and Space Law*, vol 4 (Utrecht: Eleven International Publishing, 2008).
- Newell, Peter & Matthew Paterson, *Climate Capitalism: Global Warming and the Transformation of the Global Economy* (New York: Cambridge University Press, 2010).
- Oberthür, Sebastian & Hermann E Ott, *The Kyoto Protocol: International Climate Policy for the 21st Century* (New York: Springer-Verlag, 1999).
- Okowa, Phoebe N. *State Responsibility for Transboundary Air Pollution in International Law* (New York: Oxford University Press, 2000).
- Parr, Adrian. *The Wrath of Capital: Neoliberalism and Climate Change Politics* (New York: Columbia University Press, 2013).
- Paterson, Matthew. *Global Warming and Global Politics* (London, UK: Routledge, 1996).
- Penner, Joyce E *et al*, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999).
- Rosenau, James N & Ernst-Otto Czempiel, eds, *Governance Without Government: Order and Change in World Politics* (Cambridge: Cambridge University Press, 1992).
- Sands, Philippe *et al*, *Principles of International Environmental Law*, 3rd ed (New York:

- Cambridge University Press, 2012).
- Sinclair, Timothy J. *Global Governance* (Cambridge: Polity Press, 2012).
- Solomon, Susan *et al*, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007).
- Starke, JG. *Introduction to International Law*, 10th ed (London, UK: Butterworths, 1989).
- Stern, Nicholas. *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007).
- . *The Global Deal: Climate Change and the Creation of a New Era of Progress and Prosperity*, 1st ed (New York: PublicAffairs, 2009).
- Stocker, Thomas F *et al*, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013).
- The Core Writing Team [Lenny Bernstein *et al*]; Rajendra K Pachauri & Andy Reisinger, eds, *Climate Change 2007: Synthesis Report: A Report of the Intergovernmental Panel on Climate Change* (Geneva: IPCC, 2008).
- The Core Writing Team [Rajendra K Pachauri *et al*]; Rajendra K Pachauri & Leo Meyer, eds, *Climate Change 2014: Synthesis Report: Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva: IPCC, 2015).
- Turner, Bryan S ed, *The Routledge International Handbook of Globalization Studies* (New York: Routledge, 2010).
- UN, Commission on Global Governance, *Our Global Neighbourhood: The Report of the Commission on Global Governance* (New York: Oxford University Press, 1995).
- Valdés, Alejandro Piera. *Greenhouse Gas Emissions from International Aviation: Legal and Policy Challenges* in Marietta Benkö, ed, *Essential Air and Space Law*, vol 14 (The Hague: Eleven International Publishing, 2015).
- Vlasic, Ivan A ed, *Explorations in Aerospace Law: Selected Essays by John Cobb Cooper 1946-1966* (Montreal: McGill University Press, 1968).
- Washington, Haydn & John Cook, *Climate Change Denial: Heads in the Sand* (London, UK: Earthscan, 2011).
- Weiss, Thomas G & Ramesh Thakur, *Global Governance and the UN: An Unfinished Journey* (Bloomington: Indiana University Press, 2010).
- Weldon, Mark B. *Fundamentals of Practical Environmentalism* (Boca Raton, Fla: CRC Press, 2011) (CRCnetBASE).
- Williams, Sharon Anne & Armand LC de Mestral, *An Introduction to International Law: Chiefly as Interpreted and Applied in Canada*, 2nd ed (Toronto: Butterworths, 1987).
- World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987).
- Zia, Asim. *Post-Kyoto Climate Governance: Confronting the Politics of Scale, Ideology, and Knowledge* (Oxford: Routledge, 2013).

#### SECONDARY MATERIAL: BOOK CHAPTERS

- Barker, Terry *et al*, “Technical Summary” in Bert Metz *et al*, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press,

2007) 25.

- Bernauer, Thomas & Lena Maria Schaffer, "Climate Change Governance" in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 441.
- Bevir, Mark. "Governance as Theory, Practice, and Dilemma" in Mark Bevir, ed, *The SAGE Handbook of Governance* (London, UK: SAGE Publications, 2011) 1.
- Beyerlin, Ulrich. "Different Types of Norms in International Environmental Law: Policies, Principles, and Rules" in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 425.
- Bodansky, Daniel; Jutta Brunnée & Ellen Hey, "International Environmental Law: Mapping the Field" in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 1.
- Boyle, Alan. "Soft Law in International Law Making" in Malcolm D Evans, ed, *International Law*, 2nd ed (Oxford: Oxford University Press, 2006) 141.
- Brown, Lee Merry. "Operations: Impact of Operational Changes on Global Emission Levels — Findings of the Operational Goals Group" in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 119.
- Carr, Mary-Elena *et al*, "Sea Level Rise in a Changing Climate: What Do We Know?" in Michael B Gerrard & Gregory E Wannier, eds, *Threatened Island Nations: Legal Implications of Rising Seas and a Changing Climate* (New York: Cambridge University Press, 2013) 15.
- Ciais, Philippe *et al*, "Carbon and Other Biogeochemical Cycles" in Thomas F Stocker *et al*, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 465.
- Clarke, Claybourne Fox & Thiago Chagas, "Aviation and Climate Change Regulation" in David Freestone & Charlotte Steck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and Beyond* (Oxford: Oxford University Press, 2009) 606.
- Cook, Allan. "Accounting for Emissions: From Costless Activity to Market Operations" in David Freestone & Charlotte Steck, eds, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and Beyond* (Oxford: Oxford University Press, 2009) 59.
- Crawford, James. "Sovereignty as a Legal Value" in James Crawford & Martti Koskenniemi, eds, *The Cambridge Companion to International Law* (New York: Cambridge University Press, 2012) 117.
- Cubasch, Ulrich *et al*, "Introduction" in Thomas F Stocker *et al*, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 119.
- Dauvergne, Peter. "Research Trends in Global Environmental Politics" in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 3.
- Dimitrov, Radoslav. "The Politics of Persuasion: UN Climate Change Negotiations" in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 72.
- Dunlap, Riley E & Aaron M McCright, "Organized Climate Change Denial" in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 144.

- Dunoff, Jeffrey L. “Levels of Environmental Governance” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 85.
- Dyer, Hugh C. “Energy and Climate Change” in Paul G Harris, ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014) 361.
- Fahey, DW *et al*, “Aviation and Climate: State of the Science” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 48.
- Falkner, Robert. “The Nation-State, International Society, and the Global Environment” in Robert Falkner, ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013) 251.
- Figueres, Christiana. “International air transport and the global effort to address climate change” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 223.
- Fleming, Gregg & Urs Ziegler, “Environmental Trends in Aviation to 2050” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 22.
- Forster, Piers *et al*, “Changes in Atmospheric Constituents and in Radiative Forcing” in Susan Solomon *et al*, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 129.
- Foucault, Michel. “Afterword: The Subject and Power” in Hubert Dreyfus & Paul Rabinow, eds, *Michel Foucault: Beyond Structuralism and Hermeneutics*, 2nd ed (Chicago: University of Chicago Press, 1983) 208.
- Gardiner, Stephen M. “Climate Justice” in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 309.
- Garg, Amit *et al*, “Volume 2: Energy” in Simon Eggleston *et al*, eds, *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (Hayama, Japan: Institute for Global Environmental Strategies, 2006).
- Ghosh, Arunabha & Ngaire Woods, “Governing Climate Change: Lessons from other Governance Regimes” in Dieter Helm & Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009) 454.
- Giemulla, Elmar M. “Chapter 1: Chicago System: Genesis and Main Characteristics” in Elmar M Giemulla & Ludwig Weber, eds, *International and EU Aviation Law: Selected Issues* (AH Alphen aan den Rijn: Kluwer Law International, 2011) 3.
- Gupta, Joyeeta. “Changing North-South Challenges in Global Environmental Politics” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 97.
- Gupta, Sujata *et al*, “Policies, Instruments and Co-operative Arrangements” in Bert Metz *et al*, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 745.
- Held, David & Angus Hervey, “Democracy, Climate Change and Global Governance: Democratic Agency and the Policy Menu Ahead” in David Held, Angus Fane-Hervey & Marika Theros, eds, *The Governance of Climate Change: Science, Economics, Politics and Ethics* (Cambridge: Polity Press, 2011) 89.
- Helm, Dieter. “Climate-change Policy: Why has so Little been Achieved?” in Dieter Helm &

- Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009) 9.
- Hepburn, Cameron & Nicholas Stern, “The Global Deal on Climate Change” in Dieter Helm & Cameron Hepburn, eds, *The Economics and Politics of Climate Change* (New York: Oxford University Press, 2009) 36.
- Hoffmann, Matthew J. “Global Climate Change” in Robert Falkner, ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013) 3.
- Hongo, Takashi. “Market-Based Measures: Offset Credits as an Option for “Destination Green”” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 146.
- Howard, Andrew. “Status and Structure of the Carbon Market” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 132.
- Hupe, Jane. “Towards Environmental Sustainability” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 11.
- ICAO Secretariat, “ICAO Programme of Action on International Aviation and Climate Change” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 8.
- . “Aviation Outlook Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 18.
- . “Climate Change Outlook” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 31.
- . “ICAO’s Global Air Traffic Management (ATM): Operational Concept and Global Air Navigation Plan” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 98.
- . “Economic Instruments: Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 128.
- . “Sustainable Alternative Fuels for Aviation: Overview” in ICAO, *ICAO Environmental Report 2010: Aviation and Climate Change* (Montreal: ICAO, 2010) 158.
- . “Air Traffic and Fleet Forecasts” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 18.
- . “Overview: Global Emissions” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 96.
- . “Operations: Operational Improvements to Reduce Global Emissions” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 112.
- . “Operations: ICAO Block Upgrades Minimizing Adverse Environmental Effects of Civil Aviation Activities” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 114.
- . “Overview – Sustainable Alternative Fuels: Sustainable Alternative Fuels for Aviation” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 122.
- . “Overview – Market-Based Measures: Market-Based Measures” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 138.
- ICAO Sustainable Alternative Fuels (SUSTAF) Experts Group, “Sustainable Alternative Fuels: Challenges for the Development and Deployment of Sustainable Alternative Fuels in Aviation: Outcomes of ICAO’s SUSTAF Experts Group” in ICAO, *ICAO*

- Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 126.
- International Air Transport Association, “Market-Based Measures: IATA Agreement on Carbon Neutral Growth” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 145.
- IPCC, “Summary for Policymakers: Aviation and the Global Atmosphere” in Joyce E Penner et al, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999) 1.
- . “Summary for Policymakers” in Susan Solomon et al, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 1.
- . “Summary for Policymakers” in Bert Metz et al, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 1.
- . “Summary for Policymakers” in Thomas F Stocker et al, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 3.
- . “Summary for Policymakers” in Christopher B Field et al, eds, *Climate Change 2014: Impacts, Adaptation, and Vulnerability: Part A: Global and Sectoral Aspects: Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014) 1.
- . “Summary for Policymakers” in Ottmar Edenhofer et al, eds, *Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014) 1.
- Kacowicz, Arie M. “Global Governance, International Order, and World Order” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 686.
- Kartha, Sivan. “Discourses of the Global South” in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 504.
- Kolstad, Charles *et al*, “Social, Economic, and Ethical Concepts and Methods” in Ottmar Edenhofer et al, eds, *Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2014) 207.
- Lachs, Manfred. “Freedoms of the Air – the Way to Outer Space” in Tanja L Masson-Zwaan & Pablo MJ Mendes de Leon, eds, *Air and Space Law: De Lege Ferenda: Essays in honour of Henri A. Wassenbergh* (Dordrecht: Martinus Nijhoff, 1992) 241.
- Lesniewska, Feja. “Filling the Holes: the Montreal Protocol’s Non-Compliance Mechanism” in Malgosia Fitzmaurice, David M Ong & Panos Merkouris, eds, *Research Handbook on International Environmental Law* (Cheltenham, UK: Edward Elgar, 2010) 471.
- Levi-Faur, David. “From “Big Government” to “Big Governance”?” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 3.



- Lewis, Jerry S *et al*, “Aircraft Technology and Its Relation to Emissions” in Joyce E Penner *et al*, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999) 217.
- Lipschutz, Ronnie D & Felicia Allegra Peck, “Climate Change, Globalization, and Carbonization” in Bryan S Turner, ed, *The Routledge International Handbook of Globalization Studies* (New York: Routledge, 2010) 182.
- Maurice, Lourdes. “Technology: ICAO Goals for Aviation Fuel Burn Reduction from Technology” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 103.
- Meckling, Jonas & Cameron Hepburn, “Economic Instruments for Climate Change” in Robert Falkner, ed, *The Handbook of Global Climate and Environment Policy*, 1st ed (Chichester, West Sussex: John Wiley & Sons, 2013) 468.
- Norgaard, Kari Marie. “Climate Denial: Emotion, Psychology, Culture, and Political Economy” in John S Dryzek, Richard B Norgaard & David Schlosberg, eds, *Oxford Handbook of Climate Change and Society* (Oxford: Oxford University Press, 2011) 399.
- Ong, David M. “International legal efforts to address human-induced global climate change” in Malgosia Fitzmaurice, David M Ong & Panos Merkouris, eds, *Research Handbook on International Environmental Law* (Cheltenham, UK: Edward Elgar, 2010) 450.
- Peters, B Guy. “Governance as Political Theory” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 19.
- Prather, Michael *et al*, “Potential Climate Change from Aviation” in Joyce E Penner *et al*, eds, *Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (Cambridge: Cambridge University Press, 1999) 185.
- Ramaswamy, V *et al*, “Radiative Forcing of Climate Change” in JT Houghton *et al*, eds, *Climate Change 2001: The Scientific Basis: Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2011) 349.
- Rayner, Tim & Andrew Jordan, “Governing Climate Change: the Challenge of Mitigating and Adapting in a Warming World” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 222.
- Redgwell, Catherine. “International Environmental Law” in Malcolm D Evans, ed, *International Law*, 3rd ed (New York: Oxford University Press, 2010) 687.
- Reitze, Arnold W. “Air and Climate Change” in Roger R Martella & J Brett Grosko, eds, *International Environmental Law: The Practitioner’s Guide to the Laws of the Planet* (Chicago: American Bar Association, 2014) 61.
- Ribeiro, Suzana Kahn *et al*, “Transport and its infrastructure” in Bert Metz *et al*, eds, *Climate Change 2007: Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 323.
- Riegle, Leslie & Muni Majjigi, “Technology: Pushing the Technology Envelope” in ICAO, *ICAO Environmental Report 2013: Aviation and Climate Change* (Montreal: ICAO, 2013) 100.
- Rosenau, James N. “Governance, Order, and Change in World Politics” in James N Rosenau &

- Ernst-Otto Czempiel, eds, *Governance Without Government: Order and Change in World Politics* (Cambridge: Cambridge University Press, 1992) 1.
- Rothstein, Bo. “Good Governance” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 143.
- Rowlands, Ian H. “Atmosphere and Outer Space” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 315.
- Ruggie, John Gerard. “Foreword” in Thomas G Weiss & Ramesh Thakur, *Global Governance and the UN: An Unfinished Journey* (Bloomington: Indiana University Press, 2010) xv.
- Shelton, Dinah. “Equity” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 639.
- . “Soft Law” in David Armstrong, ed, *Routledge Handbook of International Law* (Oxford: Routledge, 2009) 68.
- Singh, Nagendra. “Sustainable Development as a Principle of International Law” in PJIM de Waart, Paul Peters & Erik Denters, eds, *International Law and Development* (Dordrecht: Martinus Nijhoff, 1988) 1.
- Solomon, Susan *et al*, “Technical Summary” in Susan Solomon *et al*, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 19.
- Stevenson, Hayley. “Alternative Theories: Constructivism, Marxism and Critical Approaches” in Paul G Harris, ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014) 42.
- Stewart, Richard B. “Instrument Choice” in Daniel Bodansky, Jutta Brunnée & Ellen Hey, eds, *The Oxford Handbook of International Environmental Law* (New York: Oxford University Press, 2007) 147.
- Stocker, Thomas F *et al*, “Technical Summary” in Thomas F Stocker *et al*, eds, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2013) 33.
- Treut, Hervé Le *et al*, “Historical Overview of Climate Change Science” in Susan Solomon *et al*, eds, *Climate Change 2007: The Physical Science Basis: Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press, 2007) 93.
- Vogler, John. “Studying the Global Commons: Governance without Politics?” in Peter Dauvergne, ed, *Handbook of Global Environmental Politics*, 2nd ed (Cheltenham, UK: Edward Elgar, 2012) 172.
- . “Mainstream Theories: Realism, Rationalism and Revolutionism” in Paul G Harris, ed, *Routledge Handbook of Global Environmental Politics* (Oxford: Routledge, 2014) 30.
- Yang, Tseming. “The Top Ten Trends in International Environmental Law” in Roger R Martella & J Brett Grosko, eds, *International Environmental Law: The Practitioner’s Guide to the Laws of the Planet* (Chicago: American Bar Association, 2014) 47.
- Zumbansen, Peer. “Governance: an Interdisciplinary Perspective” in David Levi-Faur, ed, *Oxford Handbook of Governance* (Oxford: Oxford University Press, 2012) 83.
- “Editors’ Introduction” in David Held, Angus Fane-Hervey & Marika Theros, eds, *The*

*Governance of Climate Change: Science, Economics, Politics and Ethics* (Cambridge: Polity Press, 2011) 1.

“Summary of Conclusions” in Nicholas Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007) xv.

#### SECONDARY MATERIAL: JOURNAL ARTICLES

- Abbott, Kenneth W & Duncan Snidal, “Hard and Soft Law in International Governance” (2000) 54:3 Intl Organization 421.
- Abeyratne, Ruwantissa. “Emissions Trading – Recommendations of CAEP/7 and the European Perspective” (2007) 32:4-5 Air & Space L 358 (Kluwer Law Online).
- Adam, Michel. “ICAO Assembly’s Resolution on Climate Change: A ‘Historic’ Agreement?” (2011) 36:1 Air & Space L 23 (Kluwer Law Online).
- Ahmad, Md Tanveer. “Achieving Global Safety in Civil Aviation: A Critical Analysis of Contemporary Safety Oversight Mechanisms” (2012) 37 Ann Air & Sp L 81.
- . “The CJEU’s Radical ETS Judgment: Destabilizing the Chicago Convention System” (2013) 13:1 Issues in Aviation L & Policy 139.
- . “Environmental Effectiveness of ICAO’s Basket of Mitigation Measures to Arrest Emissions from International Civil Aviation” (2014) 39 Ann Air & Sp L 75.
- . “Evaluating the Effectiveness of the European Union Emissions Trading System to Reduce Emissions from International Civil Aviation” (2015) 11:1 JSDLP 115.
- Alvarez, José E. “Multilateralism and Its Discontents” (2000) 11:2 Eur J Intl L 393.
- Anger, Annela. “Including Aviation in the European Emissions Trading Scheme: Impacts on the Industry, CO<sub>2</sub> Emissions and Macroeconomic Activity in the EU” (2010) 16:2 J Air Transport Management 100.
- . & Jonathan Köhler, “Including Aviation Emissions in the EU ETS: Much Ado About Nothing? A Review” (2010) 17:1 Transport Policy 38.
- Bartels, Lorand. “The WTO Legality of the Application of the EU’s Emission Trading System to Aviation” (2012) 23:2 Eur J Intl L 429.
- Barton, Jane. “Tackling Aviation Emissions: the Challenges ahead” (2006) 3:4 J Eur Envntl & Plan L 316 (HeinOnline).
- . “Including Aviation in the EU Emissions Trading Scheme: Prepare for Take-off” (2008) 5:2 J Eur Envntl & Plan L 183 (HeinOnline).
- Bertele, Manfred & Holger H Mey, “Unilateralism in Theory and Practice” (1998) 17:2 Comparative Strategy 197 (Taylor & Francis Online).
- Bilder, Richard B. “The Canadian Arctic Waters Pollution Prevention Act: New Stresses on the Law of the Sea” (1970–1971) 69:1 Mich L Rev 1 (HeinOnline).
- . “The Role of Unilateral State Action in Preventing International Environmental Injury” (1981) 14 Vand J Transnat’l L 51 (HeinOnline).
- Böckstiegel, Karl-Heinz & Paul Michael Krämer, “Filling in the Gaps of the Chicago Convention: Main Features of the New Legal Framework for Aviation in the European Community” (1994) 19:1 Ann Air & Sp L 127.
- Bodansky, Daniel. “What’s So Bad about Unilateral Action to Protect the Environment?” (2000) 11:2 Eur J Intl L 339.
- Bogojević, Sanja. “Legalising Environmental Leadership: A Comment on the CJEU’S Ruling in C-366/10 on the Inclusion of Aviation in the EU Emissions Trading Scheme” (2012)

- 24:2 J Envtl L 345.
- Böhler, Dirk. “The EU Emissions Trading Scheme - Fixing A Broken Promise” (2013) 15 Envtl L Rev 95 (HeinOnline).
- Borger, Gudo. “All things not being equal: Aviation in the EU ETS” (2012) 3:3-4 Climate L 265 (IOS Press).
- Burger, Joanna & Michael Gochfeld, “The Tragedy of the Commons 30 Years Later” (1998) 40:10 Environment: Science & Policy for Sustainable Development 4 (Taylor & Francis).
- Carminati, M Vittoria Giugi. “Clean Air & Stormy Skies: The EU-ETS Imposing Carbon Credit Purchases on United States Airlines” (2010) 37:2 Syracuse J Intl L & Com 127 (HeinOnline).
- Ciolino, Katelyn E. “Up in the Air: The Conflict Surrounding the European Union’s Aviation Directive and the Implications of a Judicial Resolution” (2012–2013) 38:3 Brook J Intl L 1151 (HeinOnline).
- Cocca, Aldo Armando. “The Chicago Convention and Technological Development in Air and Space” (1994) 19:2 Ann Air & Sp L 135.
- de Chazournes, Laurence Boisson. “Unilateralism and Environmental Protection: Issues of Perception and Reality of Issues” (2000) 11:2 Eur J Intl L 315.
- de Leon, Pablo Mendes. “Enforcement of the EU ETS: The EU’s Convulsive Efforts to Export its Environmental Values” (2012) 37 Air & Space L 287 (Kluwer Law Online).
- Dupuy, Pierre-Marie. “Soft Law and the International Law of the Environment” (1990–1991) 12:2 Mich J Intl L 420 (HeinOnline).
- . “The Place and Role of Unilateralism in Contemporary International Law” (2000) 11:1 Eur J Intl L 19.
- Fahey, Elaine. “The EU Trading Scheme and the Court of Justice: The ‘High Politics’ of Indirectly Promoting Global Standards” (2012) 13:11 German LJ 1247 (HeinOnline).
- . & Ester Herlin-Karnell, “EU Law qua Global Governance Law? Deciphering Regulatory and Constitutional Competence Between EU Environmental Law and Global Governance” (2012) 13:11 German LJ 1147 (HeinOnline).
- Ferreira-Snyman, MP. “The Evolution of State Sovereignty: A Historical Overview” (2006) 12:2 Fundamina 1 (HeinOnline).
- Finkelstein, Lawrence S. “What is Global Governance?” (1995) 1:3 Global Governance 367 (JSTOR).
- Fitzgerald, P Paul. “Europe’s Emissions Trading System: Questioning its Raison d’Etre” (2011) 10 Issues in Aviation L & Policy 189 (HeinOnline).
- . & Md Tanveer Ahmad, “Efficient Air Traffic Management: A Precondition for Reducing Hazardous Emissions from Aviation: Is Sovereignty Getting in the Way of Progress?” (2014) 63:3 ZLW 386.
- Fox, Sean T. “Responding to Climate Change: The Case for Unilateral Trade Measures to Protect the Global Atmosphere” (1996) 84:7 Geo LJ 2499 (HeinOnline).
- Gattini, Andrea. “Between Splendid Isolation and Tentative Imperialism: The EU’s Extension of its Emission Trading Scheme to International Aviation and the ECJ’s Judgment in the ATA Case” (2012) 61:4 ICLQ 977.
- Gilbert, Paul. “From Reductionism to Systems Thinking: How the Shipping Sector Can Address Sulphur Regulation and Tackle Climate Change” (2014) 43:6 Marine Policy 376.
- Grote, Matt; Ian Williams & John Preston, “Direct Carbon Emissions from Civil Aircraft” (2014) 95:9 Atmospheric Environment 214 (Elsevier).

- Guillaume, Gilbert. "ICAO at the Beginning of the 21<sup>st</sup> Century: The 8<sup>th</sup> Beaumont Memorial Lecture, 5 February 2008" (2008) 33:4/5 *Air & Space L* 313 (Kluwer Law Online).
- Haanappel, Peter. "The Transformation of Sovereignty in the Air" (1995) 20:6 *Air & Space L* 311 (Kluwer Law Online).
- Hardeman, Andreas. "Reframing Aviation Climate Politics and Policies" (2011) 36 *Ann Air & Sp L* 1.
- Hardin, Garrett. "The Tragedy of the Commons" (1968) 162:3859 *Science* 1243.
- Harris, Paul G. "Common But Differentiated Responsibility: The Kyoto Protocol and United States Policy" (1999) 7:1 *NYU Env'tl LJ* 27 (HeinOnline).
- Hartmann, Jacques. "A Battle for the Skies: Applying the European Emissions Trading System to International Aviation" (2013) 82:2 *Nordic J Intl L* 187.
- Havel, Brian F & Gabriel S Sanchez, "Toward an International Aviation Emissions Agreement" (2012) 36:2 *Harv Env'tl L Rev* 351 (HeinOnline).
- Havel, Brian F & John Q Mulligan, "The Triumph of Politics: Reflections on the Judgment of the Court of Justice of the European Union Validating the Inclusion of Non-EU Airlines in the Emissions Trading Scheme" (2012) 37:1 *Air & Space L* 3 (Kluwer Law Online).
- Hemingson, Tate L. "Why Airlines Should Be Afraid: The Potential Impact of Cap and Trade and Other Carbon Emissions Reduction Proposals on the Airline Industry" (2010) 75:3 *J Air L & Com* 741 (HeinOnline).
- Herlin-Karnell, Ester. "The EU as a Promoter of Values and the European Global Project" (2012) 13:11 *German LJ* 1225 (HeinOnline).
- Hochstetler, Kathryn; Ann Marie Clark & Elisabeth J Friedman, "Sovereignty in the Balance: Claims and Bargains at the UN Conferences on the Environment, Human Rights, and Women" (2000) 44:4 *Intl Studies Q* 591 (Wiley).
- Jansen, Bernhard. "The Limits of Unilateralism from a European Perspective" (2000) 11:2 *Eur J Intl L* 309.
- Kasper, Matthew D. "The Air Transport Association's Challenge to the European Union's Extension of Its Emissions Trading Scheme to International Aviation: A Legal Analysis" (2010) 10:1 *Issues in Aviation L & Policy* 145 (HeinOnline).
- Koh, Stephanie. "The Case Against Extending the EU Emissions Trading Scheme to International Aviation" (2012) 30 *Sing L Rev* 125 (HeinOnline).
- Konstadinides, Theodore. "When in Europe: Customary International Law and EU Competence in the Sphere of External Action" (2012) 13:11 *German LJ* 1177 (HeinOnline).
- Kotaite, Assad. "Is there a Lessening of State Sovereignty or a Real Will to co-operate globally?" (1995) 20:6 *Air & Space L* 288 (Kluwer Law Online).
- Kulovesi, Kati. "'Make Your Own Special Song, Even if Nobody Else Sings Along': International Aviation Emissions and the EU Emissions Trading Scheme" (2011) 2:4 *Climate L* 535 (IOS Press).
- . "Addressing Sectoral Emissions outside the United Nations Framework Convention on Climate Change: What Roles for Multilateralism, Minilateralism and Unilateralism?" (2012) 21:3 *RECIEL* 193 (Academic Search Complete).
- Kuzmarov, Betina. "Unilateral Acts in International Relations: Accepting the Limits of International Law" (2005) 8:1 *YB NZ Jurisprudence* 77 (HeinOnline).
- Lan, Hua. "Comments on EU Aviation ETS Directive and EU – China Aviation Emission Dispute" (2011) 45:3 *RJT* 589 (HeinOnline).
- Lee, Jae Woon. "Revisiting Freedom of Overflight in International Air Law: Minimum

- Multilateralism in International Air Transport” (2013) 38:4/5 Air & Space L 351 (Kluwer Law Online).
- Litzenberger, Ines. “Trade War in the Skies: *Air Transport Association of America and others v Secretary of State for Energy and Climate Change*”, Case Comment, (2012) 13:2 Business L Intl 209 (HeinOnline).
- Liu, Jin. “The Role of ICAO in Regulating the Greenhouse Gas Emissions of Aircraft” (2011) 5:4 Carbon & Climate L Rev 417 (Academic Search Complete).
- Lykotrafiti, Antigoni. “EU Innovation Policy: Lessons Learned from the Inclusion of Aviation in the EU Emissions Trading Scheme” (2013) 40:4 LIEI 339 (Kluwer Law Online).
- Maguire, Rowena. “Incorporating International Environmental Legal Principles into Future Climate Change Instruments” (2012) 6:2 Carbon & Climate L Rev 101 (Academic Search Complete).
- Manzini, Pietro & Anne Masutti, “The Application of the EU ETS System to the Aviation Sector: From Legal Disputes to International Retaliations?” (2012) 37:4-5 Air & Space L 307 (Kluwer Law Online).
- Mayer, Benoît. “*Case C-366/10, Air Transport Association of America and Others v. Secretary of State for Energy and Climate Change*”, Case Comment, (2012) 49:3 CML Rev 1113.
- Meltzer, Joshua. “Climate Change and Trade – The EU Aviation Directive and the WTO” (2012) 15:1 J Intl Econ L 111 (Oxford Journals).
- Milde, Michael. “Aviation Safety Oversight: Audits and the Law” (2001) 26 Ann Air & Sp L 165.
- . “The EU Emissions Trading Scheme: Confrontation or Compromise?: A Unilateral Action Outside the Framework of ICAO” (2012) 61:2 ZLW 173.
- Motaal, Doaa Abdel. “Curbing CO<sub>2</sub> Emissions from Aviation: Is the Airline Industry Headed for Defeat?” (2012) 3:1 Climate L 1 (IOS Press).
- Oels, Angela. “Rendering Climate Change Governable: From Biopower to Advanced Liberal Government?” (2005) 7:3 J Environmental Policy & Planning 185.
- Parker, Charles F & Christer Karlsson, “Climate Change and the European Union’s Leadership Moment: An Inconvenient Truth?” (2010) 48:4 J Common Market Studies 923 (Wiley).
- Petersen, Malte. “The Legality of the EU’s Stand-Alone Approach to the Climate Impact of Aviation: The Express Role Given to the ICAO by the Kyoto Protocol” (2008) 17:2 RECIEL 196 (Academic Search Complete).
- Preston, Holly; David S Lee & Paul D Hooper, “The Inclusion of the Aviation Sector within the European Union’s Emissions Trading Scheme: What are the Prospects for a More Sustainable Aviation Industry?” (2012) 2 Environmental Development 48.
- Rajamani, Lavanya. “The Principle of Common but Differentiated Responsibility and the Balance of Commitments under the Climate Regime” (2000) 9:2 RECIEL 120.
- Reagan, Daniel B. “Putting International Aviation into the European Union Emissions Trading Scheme: Can Europe Do It Flying Solo?” (2008) 35:2 BC Envtl Aff L Rev 349 (HeinOnline).
- Rosenau, James N. “Governance in the Twenty-first Century” (1995) 1:1 Global Governance 13 (HeinOnline).
- Sands, Philippe. “‘Unilateralism’, Values, and International Law” (2000) 11:2 Eur J Intl L 291.
- Scherzer, Jörn & Melanie Hutton, “Aviation Impacts of the New Zealand Emissions Trading Scheme” (2011) 66:3 ICAO Journal 16, online: ICAO <[www.icao.int/publications/journalsreports/2011/6603\\_en.pdf](http://www.icao.int/publications/journalsreports/2011/6603_en.pdf)>.
- Schlumberger, Charles E. “Are Alternative Fuels an Alternative?: A Review of the Opportunities

- and Challenges of Alternative Fuels for Aviation” (2010) 35:1 *Ann Air & Sp L* 119.
- Schubert, Francis P. “The Creation of a Single European Sky: The Shrinking Concept of Sovereignty” (2000) 25 *Ann Air & Sp L* 239.
- Schwarze, Gilbert. “Including Aviation into the European Union’s Emissions Trading Scheme” (2007) 16:1 *Eur Envtl L Rev* 10 (Kluwer Law Online).
- Scott, Joanne & Lavanya Rajamani, “EU Climate Change Unilateralism” (2012) 23:2 *Eur J Intl L* 469.
- Secor, Patrick. “European Union Law – EU Emissions Standards May Be Applied to Third-State Airlines Departing from Member States - Case C-366/10, *Air Transp. Ass’n of Am. v. Sec’y of State for Energy & Climate Change*, 49(3) C.M.L.R. 1113 (2011)”, Case Comment, (2012) 35:2 *Suffolk Transnat’l L Rev* 505 (HeinOnline).
- Seigfried, Charlene Haddock. “The Dangers of Unilateralism” (2006) 18:3 *NWSA J* 20 (JSTOR).
- Shaffer, Gregory & Daniel Bodansky, “Transnationalism, Unilateralism and International Law” (2012) 1:1 *Transnational Environmental L* 31.
- Shindell, Drew *et al*, “Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security” (2012) 335:6065 *Science* 183.
- Shrewsbury, Stephen M. “September 11th and the Single European Sky: Developing Concepts of Airspace Sovereignty” (2003) 68:1 *J Air L & Com* 115 (HeinOnline).
- Staniland, Martin. “Air Transports and the EU’s Emissions Trading Scheme: Issues and Arguments” (2008–2009) 8:2 *Issues in Aviation L & Policy* 153 (HeinOnline).
- Stern, Nicholas. “Economic Development, Climate and Values: Making Policy” (2015) 282:1812 *Proceedings Royal Society B: Biological Sciences* 1.
- Stoker, Gerry. “Governance as Theory: Five Propositions” (1998) 50:155 *Intl Social Science J* 17 (Wiley).
- Sunstein, Cass R. “Social Norms and Social Roles” (1996) 96:4 *Colum L Rev* 903 (JSTOR).
- Truxal, Steven. “The ICAO Assembly Resolutions on International Aviation and Climate Change: An Historic Agreement, a Breakthrough Deal, and the Cancun Effect” (2011) 36:3 *Air & Space L* 217 (Kluwer Law Online).
- Tunteng, Verki Michael *et al*, “Legal Analysis of the Inclusion of Civil Aviation in the European Union Emissions Trading System (EU ETS)” (2012) 24:3 *Envtl L & Mgmt* 119.
- Van Schaik, Louise & Simon Schunz, “Explaining EU Activism and Impact in Global Climate Politics: Is the Union a Norm- or Interest-Driven Actor?” (2012) 50:1 *J Common Market Studies* 169 (Wiley).
- Vasilogeorgi, Isavella Maria. “27 Against The World: The EU ETS as Discord’s Apple Within ICAO” (2012) 65:2 *RHDI* 531 (HeinOnline).
- Veno, Janelle. “Flying the Unfriendly Skies: The European Union’s New Proposal to Include Aviation in their Emissions Trading Scheme” (2007) 72:3 *J Air L & Com* 659 (HeinOnline).
- Vespermann, Jan & Andreas Wald, “Much Ado about Nothing? – An Analysis of Economic Impacts and Ecologic Effects of the EU-Emission Trading Scheme in the Aviation Industry” (2011) 45:10 *Transportation Research Part A: Policy and Practice* 1066.
- Voigt, Christina. “Up in the Air: Aviation, the EU Emissions Trading Scheme and the Question of Jurisdiction” (2011–2012) 14 *Cambridge YB Eur Leg Stud* 475.
- Weisslitz, Michael. “Rethinking the Equitable Principle of Common but Differentiated Responsibility: Differential Versus Absolute Norms of Compliance and Contribution in the Global Climate Change Context” (2002) 13:2 *Colo J Intl Envtl L & Pol’y* 473

(HeinOnline).

#### SECONDARY MATERIAL: ARTICLES (OTHERS)

- Ahmad, Md Tanveer. "EU Emissions Trading Scheme: Problems Presented to Canada", *European Union Centres of Excellence Newsletter* 7:1 (Winter 2012) 1, online: Carleton University <carleton.ca/euce-network-canada/wp-content/uploads/V7-1-EUCE-Newsletter-Winter2012.pdf>.
- Bo, Giovanni. "The US Challenge to the Inclusion of Aviation Activities within the EU Emissions Trading Scheme: A US-EU Dispute with Global Repercussions", *Law, Justice and Development E-Newsletter* (September 2011), online: World Bank <go.worldbank.org/TOM5W3VSK0>.
- Carleton University Centre for European Studies, "Extension: What Are International Organizations?", *EU Learning*, online: Carleton University <carleton.ca/ces/eulearning/introduction/what-is-the-eu/extension-what-are-international-organizations/>.

#### SECONDARY MATERIAL: DICTIONARIES

- Park, Chris. *A Dictionary of Environment and Conservation*, 1st ed (Oxford: Oxford University Press, 2007).  
*Cambridge Dictionaries Online*.  
*Merriam-Webster's Dictionary of Law*.  
*Oxford Advanced Learner's Dictionary*.  
*Oxford Dictionaries*.

#### SECONDARY MATERIAL: ENCYCLOPEDIA

- Besson, Samantha. "Sovereignty" in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law <opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1472>.
- Blokker, Niels M. "International Organizations or Institutions, Implied Powers" in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law <opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e467>.
- Dixit, Avinash & Barry Nalebuff, "Prisoners' Dilemma" in David R Henderson, ed, *Concise Encyclopedia of Economics*, 2nd ed (Indianapolis, Ind: Liberty Fund, 2008), online: Library of Economics and Liberty <www.econlib.org/library/Enc/PrisonersDilemma.html>.
- Frowein, Jochen A. "Ius Cogens" in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law <opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1437>.
- Philpott, Dan. "Sovereignty" in Edward N Zalta, ed, *The Stanford Encyclopedia of Philosophy* (Summer 2014 Edition), online: Stanford University <plato.stanford.edu/archives/sum2014/entries/sovereignty/>.
- Thürer, Daniel. "Soft Law" in *Max Planck Encyclopedia of Public International Law*, online: Oxford Public International Law



<opil.oup.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1469>.

OTHER MATERIAL: POLICY PAPERS, REPORTS, FACT SHEETS, STUDIES, MANUALS, ETC.

- Arctic Council, “About the Arctic Council” (7 April 2011), online: Arctic Council <[www.arctic-council.org/index.php/en/about-us/arctic-council/about-arctic-council](http://www.arctic-council.org/index.php/en/about-us/arctic-council/about-arctic-council)>.
- Bodansky, Daniel. & Elliot Diringer, “Towards An Integrated Multi-Track Climate Framework” (December 2007) prepared for the Pew Center on Global Climate Change (Pew Center on Global Climate Change, Arlington, Va), online: Pew Center on Global Climate Change <[www.c2es.org/docUploads/Multi-Track-Report.pdf](http://www.c2es.org/docUploads/Multi-Track-Report.pdf)>.
- Chiavari, Joana; Sirini Withana & Marc Pallemarts, “The Role of the EU in Attempting to ‘Green’ the ICAO”, Environmental Policy Integration and Multi-Level Governance Paper No 35 (2009), online: Basque Ecodesign Center <[www.basqueecodesigncenter.net/Documentos/Noticias/DEE85B2F-4AC2-4F04-9774-8ABFB9E11881/EPIGOV\\_PAPER\\_35\\_CHIAVARI\\_ET\\_AL.PDF](http://www.basqueecodesigncenter.net/Documentos/Noticias/DEE85B2F-4AC2-4F04-9774-8ABFB9E11881/EPIGOV_PAPER_35_CHIAVARI_ET_AL.PDF)>.
- de Mestral, Armand & Md Tanveer Ahmad, “EU Emissions Trading Scheme: Problems Presented to Canada”, Commentary, Carleton University Canada-Europe Transatlantic Dialogue (April 2012), online: Carleton University <[labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2012-07-eu-ets-scheme-ahmad-demestral.pdf](http://labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2012-07-eu-ets-scheme-ahmad-demestral.pdf)>.
- . “A Pre-Analysis of Canada–EU Aviation Relations post-ICAO Assembly Meeting Concerning Emissions Trading System”, Policy Brief, Carleton University Canada-Europe Transatlantic Dialogue (April 2013), online: Carleton University <[labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2013-04-brief-demestral-ahmad-mcgill-aviation-emissions.pdf](http://labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/2013-04-brief-demestral-ahmad-mcgill-aviation-emissions.pdf)>.
- . “Time to Support the EU ETS? – Some issues still need to be resolved”, Policy Brief, Carleton University Canada-Europe Transatlantic Dialogue (March 2014), online: Carleton University <[labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/Policy-brief1.pdf](http://labs.carleton.ca/canadaeurope/wp-content/uploads/sites/9/Policy-brief1.pdf)>.
- Deng, Biong Kuol. “The Evolving Concept and Institution of Sovereignty Challenges and Opportunities”, Africa Institute of South Africa Policy Brief No 28 (June 2010), online: Africa Institute of South Africa <[www.ai.org.za/wp-content/uploads/downloads/2011/11/No-28.-The-Evolving-Concept-and-Institution-of-Sovereignty.pdf](http://www.ai.org.za/wp-content/uploads/downloads/2011/11/No-28.-The-Evolving-Concept-and-Institution-of-Sovereignty.pdf)>.
- Edenhofer, Ottmar *et al*, “The Atmosphere as a Global Commons – Challenges for International Cooperation and Governance”, Discussion Paper 13-58, The Harvard Project on Climate Agreements (August 2013), online: Harvard University Belfer Center for Science and International Affairs <[belfercenter.ksg.harvard.edu/publication/23364/atmosphere\\_as\\_a\\_global\\_commonschallenges\\_for\\_international\\_cooperation\\_and\\_governance.html?breadcrumb=%2Fproject%2F56%2Fharvard\\_project\\_on\\_climate\\_agreements%3Fgroupby%3D0%26parent\\_id%3D%26page\\_id%3D211%26filter%3D2013](http://belfercenter.ksg.harvard.edu/publication/23364/atmosphere_as_a_global_commonschallenges_for_international_cooperation_and_governance.html?breadcrumb=%2Fproject%2F56%2Fharvard_project_on_climate_agreements%3Fgroupby%3D0%26parent_id%3D%26page_id%3D211%26filter%3D2013)>.
- European Business Aviation Association, “Aviation Taxes in Europe: A Snapshot” (15 January 2013), online: EBAA <[www.ebaa.org/documents/document/20140116101401-aviation\\_taxes\\_in\\_europe\\_-\\_a\\_snapshot\\_jan\\_2014.pdf](http://www.ebaa.org/documents/document/20140116101401-aviation_taxes_in_europe_-_a_snapshot_jan_2014.pdf)>.
- European Commission, “The EU Emissions Trading System (EU ETS)” (October 2013), online:

- European Commission <[ec.europa.eu/clima/publications/docs/factsheet\\_ets\\_en.pdf](http://ec.europa.eu/clima/publications/docs/factsheet_ets_en.pdf)>.
- Generation Investment Management, *Sustainable Capitalism*, White Paper, v 1.1 (15 February 2012), online: Generation <[www.generationim.com/media/pdf-generation-sustainable-capitalism-v1.pdf](http://www.generationim.com/media/pdf-generation-sustainable-capitalism-v1.pdf)>.
- Greenpeace, Briefing, “The Risks and Potential Impacts of Oil Exploration in the Arctic” (26 August 2010), online: Greenpeace <[www.greenpeace.org/international/Global/international/publications/climate/2010/ArcticBriefingFINAL.pdf](http://www.greenpeace.org/international/Global/international/publications/climate/2010/ArcticBriefingFINAL.pdf)>.
- ICAO, “Eligibility of civil aviation projects under the Clean Development Mechanism (CDM)” (June 2012), online: ICAO <[www.icao.int/Meetings/a38/Documents/CDM\\_Report.pdf](http://www.icao.int/Meetings/a38/Documents/CDM_Report.pdf)>.
- . “Offsets for International Aviation Emissions” (August 2012), online: ICAO <[www.icao.int/Meetings/a38/Documents/Offsets%20for%20International%20Aviation%20Emissions.v10.14%20August.pdf](http://www.icao.int/Meetings/a38/Documents/Offsets%20for%20International%20Aviation%20Emissions.v10.14%20August.pdf)>.
- . “Report on Geographic Scope of Market-based Measures (MBMS): Analysis of proposed approaches for the coverage of international aviation emissions under a market-based measure” (July 2013), online: ICAO <[www.icao.int/Meetings/a38/Documents/REPORT%20ON%20GEOGRAPHIC%20SCOPE%20OF%20MBMs.pdf](http://www.icao.int/Meetings/a38/Documents/REPORT%20ON%20GEOGRAPHIC%20SCOPE%20OF%20MBMs.pdf)>.
- IMO Secretariat, *Reduction of GHG Emissions from Ships: Third IMO GHG Study 2014 – Final Report*, IMO Marine Environment Protection Committee, 67th Sess, Agenda Item 6, Doc MEPC 67/INF.3 (25 July 2014), online: International Association of Drilling Contractors <[www.iadc.org/wp-content/uploads/2014/02/MEPC-67-6-INF3-2014-Final-Report-complete.pdf](http://www.iadc.org/wp-content/uploads/2014/02/MEPC-67-6-INF3-2014-Final-Report-complete.pdf)>.
- Intergovernmental Panel on Climate Change, *IPCC Factsheet: How Does the IPCC Approve Reports?*, online: IPCC <[www.ipcc.ch/news\\_and\\_events/docs/factsheets/FS\\_ipcc\\_approve.pdf](http://www.ipcc.ch/news_and_events/docs/factsheets/FS_ipcc_approve.pdf)>.
- International Air Transport Association, *Aviation and Climate Change: Pathway to Carbon-Neutral Growth in 2020* (Switzerland: IATA, 2009), online: IATA <[www.iata.org/whatwedo/environment/Documents/aviation-climatechange-pathway-to2020.pdf](http://www.iata.org/whatwedo/environment/Documents/aviation-climatechange-pathway-to2020.pdf)>.
- . *A Global Approach to Reducing Aviation Emissions: First Stop: Carbon-Neutral Growth from 2020* (Switzerland: IATA, 2009), online: IATA <[www.iata.org/whatwedo/environment/Documents/global-approach-reducing-emissions.pdf](http://www.iata.org/whatwedo/environment/Documents/global-approach-reducing-emissions.pdf)>.
- Jardine, Christian N. “A Methodology For Offsetting Aviation Emissions”, University of Oxford Environmental Change Institute (April 2007), online: University of Oxford <[www.eci.ox.ac.uk/research/energy/downloads/aviation-climatecare.pdf](http://www.eci.ox.ac.uk/research/energy/downloads/aviation-climatecare.pdf)>.
- Lee, DS; LL Lim & B Owen, “Mitigating future aviation CO<sub>2</sub> emissions – “timing is everything”” (27 August 2013), online: Manchester Metropolitan University Dalton Research Institute <[www.cate.mmu.ac.uk/docs/mitigating-future-aviation-co2-emissions.pdf](http://www.cate.mmu.ac.uk/docs/mitigating-future-aviation-co2-emissions.pdf)>.
- Melillo, Jerry M; Terese (TC) Richmond & Gary W Yohe, eds, *Climate Change Impacts in the United States: The Third National Climate Assessment: U.S. Global Change Research Program* (Washington, DC: US Government Printing Office, 2014).
- NAV Canada, *CIFER 2013: Collaborative Initiatives for Emissions Reductions: Forward thinking for a smaller footprint* (2013), online: NAV Canada

- <[www.navcanada.ca/EN/media/Publications/CIFER-Report-2013-EN.pdf](http://www.navcanada.ca/EN/media/Publications/CIFER-Report-2013-EN.pdf)>.
- . *Aeronautical Information Management: Canadian NOTAM Procedures Manual*, P-NOF-101 Version 14.10 (2014), online: NAV Canada <[www.navcanada.ca/EN/media/Publications/NOTAM-Manual-EN.pdf](http://www.navcanada.ca/EN/media/Publications/NOTAM-Manual-EN.pdf)>.
- Otto-Zimmermann, Konrad. “Embarking on Global Environmental Governance: Thoughts on the inclusion of Local Governments and other Stakeholders in Safeguarding the Global Environment”, International Council for Local Environmental Initiatives Paper 2011-1 vs2b (2011), online: ICLEI: Local Governments for Sustainability <[www.iclei.org/fileadmin/PUBLICATIONS/Papers/ICLEI\\_Paper\\_2011-1\\_IEG\\_20110224.pdf](http://www.iclei.org/fileadmin/PUBLICATIONS/Papers/ICLEI_Paper_2011-1_IEG_20110224.pdf)>.
- UN, *World Economic Situation and Prospects 2015* (New York: UN, 2015), online: UN <[www.un.org/en/development/desa/policy/wesp/wesp\\_archive/2015wesp\\_full\\_en.pdf](http://www.un.org/en/development/desa/policy/wesp/wesp_archive/2015wesp_full_en.pdf)>.
- UNEP, *Factsheet: Climate Change*, online: UNEP <[www.unep.org/climatechange/Portals/5/documents/Factsheets/Climate\\_change.pdf](http://www.unep.org/climatechange/Portals/5/documents/Factsheets/Climate_change.pdf)>.
- US, Central Intelligence Agency, “The World Factbook: Europe: Ireland”, online: Central Intelligence Agency <[www.cia.gov/library/publications/the-world-factbook/geos/ei.html](http://www.cia.gov/library/publications/the-world-factbook/geos/ei.html)>.
- . “The World Factbook: North America: Mexico”, online: Central Intelligence Agency <[www.cia.gov/library/publications/the-world-factbook/geos/mx.html](http://www.cia.gov/library/publications/the-world-factbook/geos/mx.html)>.
- . “The World Factbook: South America: Argentina”, online: Central Intelligence Agency <[www.cia.gov/library/publications/the-world-factbook/geos/ar.html](http://www.cia.gov/library/publications/the-world-factbook/geos/ar.html)>.
- US, Department of State, *Independent States in the World: Fact Sheet* (Washington DC: Bureau of Intelligence and Research, US Department of State, 2015), online: US Department of State <[www.state.gov/s/inr/rls/4250.htm](http://www.state.gov/s/inr/rls/4250.htm)> (visited August 20, 2015).
- Warren, FJ & DS Lemmen, eds, *Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation* (Ottawa: Government of Canada, 2014).
- Whetton, Penny et al, eds, *Climate Change in Australia: Projections for Australia’s Natural Resource Management Regions: Technical Report* (CSIRO & Bureau of Meteorology, Department of the Environment, Australian Government, 2015).
- World Bank, *Air Transport and Energy Efficiency*, Transport Papers, TP – 38 (February 2012), online: World Bank <[siteresources.worldbank.org/INTAIRTRANSPORT/Resources/TP38.pdf](http://siteresources.worldbank.org/INTAIRTRANSPORT/Resources/TP38.pdf)>.
- World Bank Data 2010 – 2014 on CO<sub>2</sub> emissions at World Bank, “CO<sub>2</sub> emissions (kt)”, online: World Bank <[data.worldbank.org/indicator/EN.ATM.CO2E.KT/countries](http://data.worldbank.org/indicator/EN.ATM.CO2E.KT/countries)>.
- World Bank Data 2010 – 2014 on CO<sub>2</sub> emissions per capita at World Bank, “CO<sub>2</sub> emissions (metric tons per capita)”, online: World Bank <[data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries](http://data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries)>.
- World Health Organization, *Climate Change and Health*, Fact sheet No 266 (Reviewed August 2014), online: World Health Organization <[www.who.int/mediacentre/factsheets/fs266/en/](http://www.who.int/mediacentre/factsheets/fs266/en/)>.
- World Resources Institute, “CAIT - Country Greenhouse Gas Emissions Data”, online: World Resources Institute <[www.wri.org/resources/data-sets/cait-country-greenhouse-gas-emissions-data](http://www.wri.org/resources/data-sets/cait-country-greenhouse-gas-emissions-data)>.

## SECONDARY MATERIAL: THESES/DISSERTATIONS

Fossungu, Peter Ateh-Afac. *A Critique of the Powers and Duties of the Assembly of the*

*International Civil Aviation Organization (ICAO)* (LLM Thesis, McGill University Institute of Air & Space Law, 1996) [unpublished].

Norton, Travis M. *Aircraft Greenhouse Gas Emissions during the Landing and Takeoff Cycle at Bay Area Airports* (Master's Project, University of San Francisco, 2014) [unpublished].

SECONDARY MATERIAL: CONFERENCE PAPERS, PRESENTATIONS, ADDRESSES,  
ETC.

Brand, Sam. "An Introduction to Market-based Measures" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination Green", Montreal, 14 – 16 May 2013) [unpublished].

Cirilo, Carlos. "PBN: Global Implementation Situation" (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

Cochrane, Jeff. "Canadian PBN Implementation" (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

Delbeke, Jos. "A New Flightplan – Getting Global Aviation Climate Measures Off the Ground" (Key Note Speech delivered at the Getting Global Aviation Climate Measures Off the Ground Conference, Norway House, Brussels, 7 February 2012) [unpublished], online: European Commission <[ec.europa.eu/clima/news/docs/speech\\_en.pdf](http://ec.europa.eu/clima/news/docs/speech_en.pdf)>.

Figueiredo, Celso. "PBN Operational Implementation: *Performance Based Navigation (PBN) in the SAM Region*" (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

Gittens, Angela. "Airports and PBN, will it make a difference?" (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

González, Roberto Kobeh. "Towards a Transformed ATM environment – Working together" (Opening address by the President of the ICAO Council to the World ATM Congress 2013, Madrid, 12 – 14 February 2013) [unpublished].

Hongo, Takashi. "Flexible and Effective measures – Market Base Approach" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination Green", Montreal, 14 – 16 May 2013) [unpublished].

Hupe, Jane. "Aviation and Environment: Developments Since the Last Assembly" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination Green", Montreal, 14 – 16 May 2013) [unpublished].

Lewis, Michael S. "PBN – A Commercial Data and Service Provider Perspective – Are we ready to go?" (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

Marchi, Pierre Alibert. "PBN and Regional Aircraft: Legacy, turboprop and regional issues" (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

Petsonk, Annie. "A Global MBM for Aviation and Climate Change: The Time is Now!" (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, "Destination Green", Montreal, 14 – 16 May 2013) [unpublished].

Ray, Elizabeth L. "The PBN Toolbox: Building the Performance Based National Airspace System" (Presentation delivered at the ICAO Performance-based Navigation (PBN)

- Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].
- Rix, Robin. “Overview of the United Nations offset mechanisms” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished].
- Roturier, Benoit. “RNP Approaches” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].
- Stealey, Alan. Address (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].
- Steele, Paul. “Aviation – Benefits Beyond Borders – ICAO Destination Green” (Presentation delivered at the ICAO Symposium on Aviation and Climate Change, “Destination Green”, Montreal, 14 – 16 May 2013) [unpublished].
- Sumner, Shane. “Regional Forum: “Creating More Lift”: ICAO Asia/Pacific Region” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].
- Walter, Randy. “GE Aviation Systems: PBN Avionics Implementation and Certification” (Presentation delivered at the ICAO Performance-based Navigation (PBN) Symposium and Workshops, Montreal, 16 – 19 October 2012) [unpublished].

#### OTHER MATERIAL: PRESS RELEASES

- Airbus, Press Release, “New Airbus aircraft list prices for 2015” (13 January 2015), online: Airbus Press Centre <[www.airbus.com/presscentre/%20pressreleases/press-release-detail/detail/new-airbus-aircraft-list-prices-for-2015/](http://www.airbus.com/presscentre/%20pressreleases/press-release-detail/detail/new-airbus-aircraft-list-prices-for-2015/)>.
- Association of Asia Pacific Airlines, Press Release, Issue 2011:22, “AAPA Calls for Renewed Political Dialogue on EU ETS: CJEU decision fails to calm international political furore” (23 December 2011), online: AAPA Media Centre <[www.aapairlines.org/resource\\_centre/AAPA\\_PR\\_Issue22\\_AviationEnvironmentEUETSandCJEU\\_23Dec11.pdf](http://www.aapairlines.org/resource_centre/AAPA_PR_Issue22_AviationEnvironmentEUETSandCJEU_23Dec11.pdf)>.
- Association of Asia Pacific Airlines, Press Release, Issue 2012:21, “AAPA Welcomes Suspension of EU ETS: Focus rightly shifts to ICAO” (13 November 2012), online: AAPA Media Centre <[www.aapairlines.org/resource\\_centre/AAPA\\_PR\\_Issue21\\_Environment\\_EU\\_ETS\\_Suspension\\_13Nov12.pdf](http://www.aapairlines.org/resource_centre/AAPA_PR_Issue21_Environment_EU_ETS_Suspension_13Nov12.pdf)>.
- Association of Asia Pacific Airlines, Press Release, Issue 2013:16, “AAPA Comments on Proposed Revisions to EU ETS” (17 October 2013), online: AAPA Media Centre <[www.aapairlines.org/resource\\_centre/AAPA\\_PR\\_Issue16\\_EU\\_ETS\\_17Oct13.pdf](http://www.aapairlines.org/resource_centre/AAPA_PR_Issue16_EU_ETS_17Oct13.pdf)>.
- Aviation Environment Federation and Transport & Environment, Press Release, “Non-EU airlines in spotlight after Saudi carrier breaches emissions rules” (19 May 2015), online: Aviation Environment Federation <[www.aef.org.uk/2015/05/19/non-eu-airlines-in-spotlight-after-saudi-carrier-breaches-emissions-rules/](http://www.aef.org.uk/2015/05/19/non-eu-airlines-in-spotlight-after-saudi-carrier-breaches-emissions-rules/)>.
- EC, News Release, “Commission proposes to ‘stop the clock’ on international aviation in the EU ETS pending 2013 ICAO General Assembly” (12 November 2012), online: European Commission Climate Action <[ec.europa.eu/clima/news/articles/news\\_2012111202\\_en.htm](http://ec.europa.eu/clima/news/articles/news_2012111202_en.htm)>.
- EC, News Release, “Auctions for 2012 aviation allowances put on hold” (16 November 2012), online: European Commission Climate Action <[ec.europa.eu/clima/news/articles/](http://ec.europa.eu/clima/news/articles/)>.

- news\_2012111601\_en.htm>.
- EC, Press Release, Memo/07/391, “Written statement of reservation on behalf of the member states of the European Community (EC) and the other states members of the European Civil Aviation (ECAC) [made at the 36th Assembly of the International Civil Aviation Organization in Montreal, 18-28 September 2007]” (2 October 2007), online: Europa <europa.eu/rapid/press-release\_MEMO-07-391\_en.htm>.
- European Commission, Press Release, Memo/11/139, “Questions & Answers on historic aviation emissions and the inclusion of aviation in the EU’s Emission Trading System (EU ETS)” (7 March 2011), online: European Commission <europa.eu/rapid/press-release\_MEMO-11-139\_en.htm>.
- European Commission, Press Release, Memo/11/631, “Questions & Answers on the benchmark for free allocation to airlines and on the inclusion of aviation in the EU’s Emission Trading System (EU ETS)” (26 September 2011), online: European Commission <europa.eu/rapid/press-release\_MEMO-11-631\_en.htm>.
- ICAO, Press Release, PIO 14/10, “ICAO Member States Agree to Historic Agreement on Aviation and Climate Change” (8 October 2010), online: ICAO <www.icao.int/Newsroom/Pages/icao-member-states-agree-to-historic-agreement-on-aviation-and-climate-change.aspx>.
- ICAO, Press Release, COM 15/12, “New Progress on Aircraft CO2 Standard” (11 July 2012), online: ICAO <www.icao.int/Newsroom/Pages/new-progress-on-aircraft-CO2-standard.aspx>.
- ICAO, Press Release, COM 19/12, “Aviation Groups Unite to Achieve Instantaneous Global System Upgrade” (15 November 2012), online: ICAO <www.icao.int/Newsroom/Pages/aviation-groups-unite-to-achieve-instantaneous-global-system-upgrade.aspx>.
- ICAO, News Release, COM 20/12, “New ICAO Council High-level Group to Focus on Environmental Policy Challenges” (15 November 2012), online: ICAO <www.icao.int/Newsroom/Pages/new-ICAO-council-high-level-group-to-focus-on-environmental-policy-challenges.aspx>.
- ICAO, Press Release, COM 4/13, “ICAO Environmental Protection Committee Delivers Progress on New Aircraft CO2 and Noise Standards” (14 February 2013), online: ICAO <www.icao.int/Newsroom/Pages/ICAO-environmental-protection-committee-delivers-progress-on-new-aircraft-CO2-and-noise-standards.aspx>.
- ICAO, Press Release, “Dramatic MBM Agreement and Solid Global Plan Endorsements Help Deliver Landmark ICAO 38th Assembly” (4 October 2013), online: ICAO <www.icao.int/Newsroom/Pages/mbm-agreement-solid-global-plan-endorsements.aspx>.
- IMO, Press Briefing, 34, “IMO’s MEPC progresses work on air pollution and energy efficiency” (23 October 2014), online: IMO <www.imo.org/en/MediaCentre/PressBriefings/Pages/34-mepc-67-emissions.aspx>.
- India, Ministry of Civil Aviation, Press Release, 76388, “International Meeting of ICAO Council and Non-EU Member States on Inclusion of Aviation in EU-ETS Held” (30 September 2011), online: Government of India Press Information Bureau <pib.nic.in/newsite/erelease.aspx?relid=76388>.
- International Air Transport Association, Press Release, 50 (24 October 2008), online: IATA <www.iata.org/pressroom/pr/Pages/2008-10-24-02.aspx>.

- International Air Transport Association, Press Release, 46, “IATA Applauds ICAO Agreement on Aviation and Climate Change: Industry Remains Committed to More Ambitious Goals” (8 October 2010), online: IATA <[www.iata.org/pressroom/pr/Pages/2010-10-08-01.aspx](http://www.iata.org/pressroom/pr/Pages/2010-10-08-01.aspx)>.
- International Air Transport Association, Press Release, 34, “Historic Agreement on Carbon-Neutral Growth” (3 June 2013), online: IATA <[www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx](http://www.iata.org/pressroom/pr/Pages/2013-06-03-05.aspx)>.
- Transport & Environment, Press Release, “Environmental Groups Hail Court Decision on Aviation Climate Law” (21 December 2011), online: Transport & Environment Pressroom <[www.transportenvironment.org/press/environmental-groups-hail-court-decision-aviation-climate-law](http://www.transportenvironment.org/press/environmental-groups-hail-court-decision-aviation-climate-law)>.
- UNEP, Press Release, “UN Climate Change Conference in Cancun delivers balanced package of decisions, restores faith in multilateral process” (11 December 2010), online: UNEP <[www.unep.org/Documents.Multilingual/Default.asp?DocumentID=653&ArticleID=6866&l=en&WT.rss\\_f=pr&WT.rss\\_a=653-6866](http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=653&ArticleID=6866&l=en&WT.rss_f=pr&WT.rss_a=653-6866)>.
- UN, Climate Change Secretariat, Press Release, “At UN Climate Change Conference in Doha, governments take next essential step in global response to climate change” (8 December 2012), online: UNFCCC <[unfccc.int/files/press/press\\_releases\\_advisories/application/pdf/pr20120812\\_cop18\\_close.pdf](http://unfccc.int/files/press/press_releases_advisories/application/pdf/pr20120812_cop18_close.pdf)>.
- US Department of the Interior, US Geological Survey, News Release, “90 Billion Barrels of Oil and 1,670 Trillion Cubic Feet of Natural Gas Assessed in the Arctic” (23 July 2008), online: US Geological Survey <[www.usgs.gov/newsroom/article.asp?ID=1980](http://www.usgs.gov/newsroom/article.asp?ID=1980)>.

#### OTHER MATERIAL: MAGAZINES

- Borgerson, Scott G. “Arctic Meltdown: The Economic and Security Implications of Global Warming”, *Foreign Affairs* 87:2 (March/April 2008) 63 (HeinOnline).
- Mola, Roger A. “Hush Kits: Engineer to airplane: Stifle”, *Air & Space Magazine* (January 2005), online: Air & Space Smithsonian <[www.airspacemag.com/how-things-work/hush-kits-8747402/](http://www.airspacemag.com/how-things-work/hush-kits-8747402/)>.
- Schofield, Adrian & Darren Shannon, “Common Cause?”, *Aviation Week & Space Technology* 172:38 (18 October 2010) 43.

#### OTHER MATERIAL: NEWS

- AFP, “Global airlines slam new German departure tax”, *The Independent [UK]* (9 June 2010), online: The Independent <[www.independent.co.uk/travel/news-and-advice/global-airlines-slam-new-german-departure-tax-1995251.html](http://www.independent.co.uk/travel/news-and-advice/global-airlines-slam-new-german-departure-tax-1995251.html)>.
- Altmeyer, Cyril. “China extends Airbus production venture, unblocks A330 deal”, *Reuters* (26 March 2014), online: Reuters <[www.reuters.com/article/2014/03/26/us-france-china-airbus-idUSBREA2P1HZ20140326](http://www.reuters.com/article/2014/03/26/us-france-china-airbus-idUSBREA2P1HZ20140326)>.
- Barnett, Jim. “Investigators find cracks in second Dreamliner engine”, *CNN Travel* (29 September 2012), online: CNN <[www.cnn.com/2012/09/28/travel/dreamliner-engine/index.html](http://www.cnn.com/2012/09/28/travel/dreamliner-engine/index.html)>.
- . “Airline: Dreamliner fuel leak due to an open valve”, *CNN Travel* (9 January 2013), online: CNN <[www.cnn.com/2013/01/08/travel/dreamliner-fuel-leak/index.html](http://www.cnn.com/2013/01/08/travel/dreamliner-fuel-leak/index.html)>.
- . “Japanese airlines suspend Dreamliner flights after emergency landing”, *CNN Travel* (16

- January 2013), online: CNN <[www.cnn.com/2013/01/15/travel/japan-dreamliner-emergency-landing/index.html](http://www.cnn.com/2013/01/15/travel/japan-dreamliner-emergency-landing/index.html)>.
- Biello, David. “Everything You Need to Know about the U.S.–China Climate Change Agreement: A turning point has been reached in the world's bid to curb global warming”, *Scientific American* (12 November 2014), online: Scientific American <[www.scientificamerican.com/article/everything-you-need-to-know-about-the-u-s-china-climate-change-agreement/](http://www.scientificamerican.com/article/everything-you-need-to-know-about-the-u-s-china-climate-change-agreement/)>.
- Buckley, Chris. “China bans airlines from joining EU emissions scheme”, *Reuters* (6 February 2012), online: Reuters <[www.reuters.com/article/2012/02/06/us-china-eu-emissions-idUSTRE81500V20120206](http://www.reuters.com/article/2012/02/06/us-china-eu-emissions-idUSTRE81500V20120206)>.
- Carey, Bill. “ICAO Joins Airlines, Nations in Opposing Emissions Trading Scheme”, *AIN online* (7 November 2011), online: AIN online <[www.ainonline.com/aviation-news/air-transport/2011-11-07/icao-joins-airlines-nations-opposing-emissions-trading-scheme](http://www.ainonline.com/aviation-news/air-transport/2011-11-07/icao-joins-airlines-nations-opposing-emissions-trading-scheme)>.
- Choudhury, Santanu. “Air India’s Dreamliner Nightmare”, *The Wall Street Journal [India]* (6 November 2013), online: The Wall Street Journal <[blogs.wsj.com/indiarealtime/2013/11/06/air-indias-dreamliner-nightmare/](http://blogs.wsj.com/indiarealtime/2013/11/06/air-indias-dreamliner-nightmare/)>.
- Cooper, Aaron. “Fire aboard empty 787 Dreamliner prompts investigation”, *CNN Travel* (8 January 2013), online: CNN <[www.cnn.com/2013/01/07/travel/dreamliner-fire/index.html](http://www.cnn.com/2013/01/07/travel/dreamliner-fire/index.html)>.
- . “Dreamliners grounded globally due to fire risk”, *CNN Travel* (17 January 2013), online: CNN <[www.cnn.com/2013/01/17/travel/dreamliner-faa/index.html](http://www.cnn.com/2013/01/17/travel/dreamliner-faa/index.html)>.
- Corp, Rob. “Dreamliner trouble: A brief history of airliner problems”, *BBC News* (17 January 2013), online: BBC News <[www.bbc.co.uk/news/uk-21059525](http://www.bbc.co.uk/news/uk-21059525)>.
- De Souza, Mike. “Joe Oliver casts doubt on climate science in defence of oilsands”, *Canada.com* (12 April 2013), online: Canada.com <[o.canada.com/technology/environment/blog-joe-oliver-casts-doubt-on-climate-science-in-defence-of-oilsands](http://o.canada.com/technology/environment/blog-joe-oliver-casts-doubt-on-climate-science-in-defence-of-oilsands)>.
- Derber, Alex. “Saudia pays first big emissions fine”, *MRO Network* (21 May 2015), online: MRO Network <[www.mro-network.com/opinion/2015/05/saudia-pays-first-big-emissions-fine/5413](http://www.mro-network.com/opinion/2015/05/saudia-pays-first-big-emissions-fine/5413)>.
- Falk, Richard & Hilal Elver, “The World can’t afford more Limas: Future Climate Change Conferences require global leadership from the US and China”, *AlJazeera [America]* (20 December 2014), online: AlJazeera America <[america.aljazeera.com/opinions/2014/12/lima-climate-changeconferenceunitednationsgreenhousegasemissions.html](http://america.aljazeera.com/opinions/2014/12/lima-climate-changeconferenceunitednationsgreenhousegasemissions.html)>.
- Flottau, Jens. “Critical Of EC, Tyler Warns Of ETS Distraction”, *Aviation Daily* (13 December 2013), online: Aviation Week <[aviationweek.com/awin/critical-ec-tyler-warns-ets-distraction](http://aviationweek.com/awin/critical-ec-tyler-warns-ets-distraction)>.
- Freedman, Andrew. “U.S. Airports Face Increasing Threat From Rising Seas”, *Climate Central* (18 June 2013), online: Climate Central <[www.climatecentral.org/news/coastal-us-airports-face-increasing-threat-from-sea-level-rise-16126](http://www.climatecentral.org/news/coastal-us-airports-face-increasing-threat-from-sea-level-rise-16126)>.
- Goldenberg, Suzanne. “Lima climate change talks reach global warming agreement”, *EurActiv.com* (15 December 2014), online: EurActiv.com <[www.euractiv.com/sections/climate-environment/lima-climate-change-talks-reach-global-warming-agreement-310800](http://www.euractiv.com/sections/climate-environment/lima-climate-change-talks-reach-global-warming-agreement-310800)>.
- Hanna, Jason. “Typhoon Chan-hom slams eastern China's Zhoushan city”, *CNN* (12 July 2015), online: CNN <[www.cnn.com/2015/07/11/asia/asia-weather-typhoon-chan](http://www.cnn.com/2015/07/11/asia/asia-weather-typhoon-chan)>.



- hom/index.html>.
- Hansen, Simon. "The China-US Climate Change Agreement is a Step Forward for Green Power Relations", *The Guardian* (14 November 2014), online: The Guardian <[www.theguardian.com/commentisfree/2014/nov/14/the-china-us-climate-change-agreement-is-a-step-forward-for-green-power-relations](http://www.theguardian.com/commentisfree/2014/nov/14/the-china-us-climate-change-agreement-is-a-step-forward-for-green-power-relations)>.
- Harvey, Fiona. "Airlines agree to curb their greenhouse gas emissions by 2020", *The Guardian* (4 June 2013), online: The Guardian <[www.theguardian.com/environment/2013/jun/04/airlines-agree-to-curb-greenhouse-gas-emissions](http://www.theguardian.com/environment/2013/jun/04/airlines-agree-to-curb-greenhouse-gas-emissions)>.
- Hepher, Tim. "Factory, design flaws caused A380 cracks", *Reuters* (27 January 2012), online: Reuters <[www.reuters.com/article/2012/01/27/uk-airbus-a-idUSLNE80N02R20120127](http://www.reuters.com/article/2012/01/27/uk-airbus-a-idUSLNE80N02R20120127)>.
- . "China halts 10 more Airbus orders: sources", *Reuters* (15 March 2012), online: Reuters <[www.reuters.com/article/2012/03/15/us-china-europe-ets-idUSBRE82E11620120315](http://www.reuters.com/article/2012/03/15/us-china-europe-ets-idUSBRE82E11620120315)>.
- Hetter, Katia & Aaron Cooper, "Dreamliner's growing pains not unusual for new airplanes, experts say", *CNN Travel* (10 January 2013), online: CNN <[www.cnn.com/2013/01/09/travel/dreamliner-problems/index.html?iref=allsearch](http://www.cnn.com/2013/01/09/travel/dreamliner-problems/index.html?iref=allsearch)>.
- Hofmann, Kurt. "Germany implements 'ecological' tax on air travelers", *ATW Plus* (10 September 2010), online: Canadian Union of Public Employees (CUPE) <[accomponent.ca/en/news/germany-implements-ecological-tax-air-travelers](http://accomponent.ca/en/news/germany-implements-ecological-tax-air-travelers)>.
- Jones, Bryony. "Paris Air Show: Race to be first with 'son of supersonic'", *CNN* (21 June 2011), online: CNN <[www.cnn.com/2011/TECH/innovation/06/21/concorde.hyper.sonic/index.html](http://www.cnn.com/2011/TECH/innovation/06/21/concorde.hyper.sonic/index.html)>.
- Jones, Charisse. "Canceled flights cost airlines, fliers millions", *USA TODAY* (2 February 2015), online: USA TODAY <[www.usatoday.com/story/travel/flights/2015/02/02/canceled-flights-cost-airlines-and-fliers-millions/22750345/](http://www.usatoday.com/story/travel/flights/2015/02/02/canceled-flights-cost-airlines-and-fliers-millions/22750345/)>.
- Karp, Aaron. "Lufthansa: Airlines' inclusion in EU ETS in danger of becoming 'fiasco'", *Air Transport World* (11 April 2011), online: Air Transport World <[atwonline.com/operations/lufthansa-airlines-inclusion-eu-ets-danger-becoming-fiasco](http://atwonline.com/operations/lufthansa-airlines-inclusion-eu-ets-danger-becoming-fiasco)>.
- . "IATA DG Tyler: EU ETS 'poisoning the atmosphere' in global aviation", *Air Transport World* (6 November 2012), online: ATW Plus <[atwonline.com/operations/iata-dg-tyler-eu-ets-poisoning-atmosphere-global-aviation](http://atwonline.com/operations/iata-dg-tyler-eu-ets-poisoning-atmosphere-global-aviation)>.
- . "Obama signs bill enabling US airlines to skirt EU ETS", *Air Transport World* (27 November 2012), online: Aviation Week <[atwonline.com/aeropolitics/obama-signs-bill-enabling-us-airlines-skirt-eu-ets](http://atwonline.com/aeropolitics/obama-signs-bill-enabling-us-airlines-skirt-eu-ets)>.
- Kennedy, Mark. "Stephen Harper and Australia's Tony Abbott won't let climate policies kill jobs", *Ottawa Citizen* (9 June 2014), online: Ottawa Citizen <[ottawacitizen.com/news/national/stephen-harper-and-australias-tony-abbott-wont-let-climate-policies-kill-jobs](http://ottawacitizen.com/news/national/stephen-harper-and-australias-tony-abbott-wont-let-climate-policies-kill-jobs)>.
- King, Ed. "Arctic Council decision leaves region open for oil and gas drilling", *RTCC: Responding to Climate Change* (23 May 2013), online: RTCC <[www.rtcc.org/2013/05/15/arctic-council-decision-leaves-region-open-for-oil-and-gas-drilling/](http://www.rtcc.org/2013/05/15/arctic-council-decision-leaves-region-open-for-oil-and-gas-drilling/)>.
- Kluger, Jeffrey. "The Climate Deniers' Newest Argument", *Time* (29 September 2014), online: Time <[time.com/3445231/climate-denier-settled-science/](http://time.com/3445231/climate-denier-settled-science/)>.

- Krukowska, Ewa & Birgit Jennen, “Germany Levies Fines on Aircraft Operators Over Emissions”, *Bloomberg* (30 April 2014), online: Bloomberg Business <[www.bloomberg.com/news/2014-04-30/germany-levies-fines-on-aircraft-operators-over-emissions.html](http://www.bloomberg.com/news/2014-04-30/germany-levies-fines-on-aircraft-operators-over-emissions.html)>.
- Kroh, Kiley & Howard Marano, “Adding Fuel to the Fire: The Climate Consequences of Arctic Ocean Drilling”, *Center for American Progress* (21 March 2013), online: Center for American Progress <[cdn.americanprogress.org/wp-content/uploads/2013/03/ArcticDrillingBrief-2.pdf](http://cdn.americanprogress.org/wp-content/uploads/2013/03/ArcticDrillingBrief-2.pdf)>.
- Lang, Chris. “The Lima Call for Climate Action: Low on ambition, low on finance, low on climate justice, low on action”, *redd-monitor.org* (16 December 2014), online: redd-monitor.org <[www.redd-monitor.org/2014/12/16/the-lima-call-for-climate-action-low-on-ambition-low-on-finance-low-on-climate-justice-low-on-action/](http://www.redd-monitor.org/2014/12/16/the-lima-call-for-climate-action-low-on-ambition-low-on-finance-low-on-climate-justice-low-on-action/)>.
- Lowe, Paul. “U.S. Officially Prohibits ETS Participation”, *Aviation International News* (3 January 2013), online: AIN Online <[www.ainonline.com/aviation-news/aviation-international-news/2013-01-03/us-officially-prohibits-ets-participation](http://www.ainonline.com/aviation-news/aviation-international-news/2013-01-03/us-officially-prohibits-ets-participation)>.
- Mahdi, Wael. “Saudi Arabia Said to Order Airline to Reject EU Carbon Rules”, *Bloomberg News* (2 October 2012), online: Bloomberg Business <[www.bloomberg.com/news/articles/2012-10-02/saudi-arabia-said-to-order-airline-to-reject-eu-emission-rules](http://www.bloomberg.com/news/articles/2012-10-02/saudi-arabia-said-to-order-airline-to-reject-eu-emission-rules)>.
- Martinez, Michael & Thom Patterson, “Fire, ‘technical issue’ on two Dreamliners raise new worries”, *CNN* (13 July 2013), online: CNN <[www.cnn.com/2013/07/12/world/europe/uk-heathrow-airplane-fire/index.html](http://www.cnn.com/2013/07/12/world/europe/uk-heathrow-airplane-fire/index.html)>.
- McGregor, Kirsty. “European airlines step up opposition to EU ETS”, *Flight Global* (9 February 2012), online: Flight Global <[www.flightglobal.com/news/articles/european-airlines-step-up-opposition-to-eu-ets-368019/](http://www.flightglobal.com/news/articles/european-airlines-step-up-opposition-to-eu-ets-368019/)>.
- Mieszkowski, Katharine. “Bush: Global Warming is Just Hot Air”, *Salon* (10 September 2004), online: Salon <[www.salon.com/2004/09/10/bush\\_276/](http://www.salon.com/2004/09/10/bush_276/)>.
- Milevska, Tanja. “EU aviation emissions proposals attacked from all sides”, *EurActiv.com* (15 November 2013), online: EurActiv.com <[www.euractiv.com/transport/commission-fails-comprehensive-p-news-531697](http://www.euractiv.com/transport/commission-fails-comprehensive-p-news-531697)>.
- Murphy, Andrew. “Airlines violating ETS law should be named”, *EurActiv.com* (21 May 2015), online: EurActiv.com <[www.euractiv.com/sections/transport/airlines-violating-ets-law-should-be-named-314763](http://www.euractiv.com/sections/transport/airlines-violating-ets-law-should-be-named-314763)>.
- Nichols, Will. “Airbus blames EU carbon trading row for falling Chinese orders”, *The Guardian* (9 March 2012), online: The Guardian Environment Network <[www.theguardian.com/environment/2012/mar/09/airbus-eu-carbon-trading-chinese](http://www.theguardian.com/environment/2012/mar/09/airbus-eu-carbon-trading-chinese)>.
- Obura, Fredrick. “African airlines oppose EU emissions trading scheme”, *Standard Digital* (16 January 2012), online: Standard Digital <[www.standardmedia.co.ke/?id=2000050064&cid=14&articleID=2000050064](http://www.standardmedia.co.ke/?id=2000050064&cid=14&articleID=2000050064)>.
- Payne, Ed. “Winter storm dodges Atlanta, weighs down parts of North Carolina”, *CNN* (4 March 2015), online: CNN <[www.cnn.com/2015/02/26/us/winter-weather/index.html](http://www.cnn.com/2015/02/26/us/winter-weather/index.html)>.
- Reuters, “European Airlines Denied Overflight”, *The Moscow Times* (13 June 2012), online: The Moscow Times <[www.themoscowtimes.com/business/article/european-airlines-denied-overflight/460211.html](http://www.themoscowtimes.com/business/article/european-airlines-denied-overflight/460211.html)>.
- Shoichet, Catherine E. “Tornadoes reported in Oklahoma, Kansas, Nebraska”, *CNN* (6 May 2015), online: CNN <[www.cnn.com/2015/05/06/us/midwest-severe-weather/index.html](http://www.cnn.com/2015/05/06/us/midwest-severe-weather/index.html)>.

- Smith, Tierney. "Opposition Mounts Over Aviation's Inclusion in EU ETS", *RTCC News* (2 October 2012), online: RTCC <[www.rtcc.org/2012/10/02/opposition-mounts-over-aviation%E2%80%99s-inclusion-in-eu-ets/](http://www.rtcc.org/2012/10/02/opposition-mounts-over-aviation%E2%80%99s-inclusion-in-eu-ets/)>.
- Sorokin, Nikita. "'The Arctic five' preserve their monopoly", *The Voice of Russia* (19 March 2013), online: Sputnik <[sputniknews.com/voiceofrussia/2013\\_03\\_19/The-Arctic-five-preserve-their-monopoly/](http://sputniknews.com/voiceofrussia/2013_03_19/The-Arctic-five-preserve-their-monopoly/)>.
- Sperry, Todd. "United 787 Dreamliner diverts due to mechanical issue", *CNN Travel* (6 December 2012), online: CNN <[www.cnn.com/2012/12/04/travel/dreamliner-diversion/index.html](http://www.cnn.com/2012/12/04/travel/dreamliner-diversion/index.html)>.
- Sutherland, Scott. "Updated: Lima Call for Climate Action gives hope for new global climate agreement", *The Weather Network* (16 December 2014), online: The Weather Network <[www.theweathernetwork.com/news/articles/lima-climate-conference-final-day-mix-concern-uncertainty-optimism/41808/](http://www.theweathernetwork.com/news/articles/lima-climate-conference-final-day-mix-concern-uncertainty-optimism/41808/)>.
- Suzuki, David. "Investigation Hits at Climate Change Denier's 'Science'", *The Huffington Post* (14 July 2011), online: The Huffington Post <[www.huffingtonpost.ca/david-suzuki/climate-change-denial\\_b\\_896543.html](http://www.huffingtonpost.ca/david-suzuki/climate-change-denial_b_896543.html)>.
- Thomas, Geoffrey. "Airline industry blasts Germany's 'ecological air travel levy'", *ATW Plus* (8 June 2010), online: ATW: Air Transport World <[atwonline.com/operations/airline-industry-blasts-germanys-ecological-air-travel-levy/](http://atwonline.com/operations/airline-industry-blasts-germanys-ecological-air-travel-levy/)>.
- Toh, Mavis. "China bans airlines from complying with EU ETS", *Flight Global* (6 February 2012), online: Flight Global <[www.flightglobal.com/news/articles/china-bans-airlines-from-complying-with-eu-ets-367796/](http://www.flightglobal.com/news/articles/china-bans-airlines-from-complying-with-eu-ets-367796/)>.
- . "India could ban airlines from complying with EU ETS", *Flight Global* (20 March 2012), online: Flight Global <[www.flightglobal.com/news/articles/india-could-ban-airlines-from-complying-with-eu-ets-369673/](http://www.flightglobal.com/news/articles/india-could-ban-airlines-from-complying-with-eu-ets-369673/)>.
- . "Indian airlines will not submit emission details for EU ETS", *Flight Global* (23 March 2012), online: Flight Global <[www.flightglobal.com/news/articles/indian-airlines-will-not-submit-emission-details-for-eu-369865/](http://www.flightglobal.com/news/articles/indian-airlines-will-not-submit-emission-details-for-eu-369865/)>.
- Topham, Gwyn. "Airline Industry: EU Emissions Trading Scheme 'could risk trade war'", *The Guardian* (11 June 2012), online: The Guardian <[www.theguardian.com/world/2012/jun/11/airline-industry-eu-emissions-trading-trade-war](http://www.theguardian.com/world/2012/jun/11/airline-industry-eu-emissions-trading-trade-war)>.
- Unnikrishnan, Madhu. "EU ETS Under Attack from Australian Lawmakers", *AviationWeek* (21 August 2012), online: Aviation Week <[aviationweek.com/awin/eu-ets-under-attack-australian-lawmakers](http://aviationweek.com/awin/eu-ets-under-attack-australian-lawmakers)>.
- Wall, Robert & Madhu Unnikrishnan, "Update: 21 Nations Sign Declaration Opposing EU ETS", *Aviation Week* (30 September 2011), online: Aviation Week Intelligence Network <[aviationweek.com/awin/update-21-nations-sign-declaration-opposing-eu-ets](http://aviationweek.com/awin/update-21-nations-sign-declaration-opposing-eu-ets)>.
- Wassener, Bettina. "More Problems for Boeing's 787 Surface in Japan", *The New York Times* (11 January 2013), online: The New York Times <[www.nytimes.com/2013/01/12/business/global/cracks-appear-in-cockpit-window-of-boeing-787.html](http://www.nytimes.com/2013/01/12/business/global/cracks-appear-in-cockpit-window-of-boeing-787.html)>.
- Zaitsev, Tom. "Russia moves to ban carriers from complying with EU ETS", *Flight Global* (23 February 2012), online: Flight Global <[www.flightglobal.com/news/articles/russia-moves-to-ban-carriers-from-complying-with-eu-368690/](http://www.flightglobal.com/news/articles/russia-moves-to-ban-carriers-from-complying-with-eu-368690/)>.
- Zander, Christina. "Russia Withholds EU Air Traffic Rights in Growing CO2 Trade Spat", 4-

- traders* (7 June 2012), online: 4-traders <[www.4-traders.com/SAS-AB-9058794/news/Russia-Withholds-EU-Air-Traffic-Rights-in-Growing-CO2-Trade-Spat-14361417/](http://www.4-traders.com/SAS-AB-9058794/news/Russia-Withholds-EU-Air-Traffic-Rights-in-Growing-CO2-Trade-Spat-14361417/)>.
- “Agreement reached by ICAO’s environmental committee on a metric for defining a CO2 standard for new aircraft”, *GREENAIRonline.com* (13 July 2012), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1568](http://www.greenaironline.com/news.php?viewStory=1568)>.
- “Air India hit with UK fine for failing to comply with Aviation EU ETS”, *GREENAIRonline.com* (5 March 2015), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2106](http://www.greenaironline.com/news.php?viewStory=2106)>.
- “Airbus asks airlines to inspect A380 engines”, *Reuters* (5 November 2010), online: Reuters <[www.reuters.com/article/2010/11/05/us-airbus-idUSTRE6A41DH20101105](http://www.reuters.com/article/2010/11/05/us-airbus-idUSTRE6A41DH20101105)>.
- “Airbus confirms more A380 cracks, announces fix”, *Reuters* (25 January 2012), online: Reuters <[www.reuters.com/article/2012/01/25/us-airbus-a-idUSTRE8001YX20120125](http://www.reuters.com/article/2012/01/25/us-airbus-a-idUSTRE8001YX20120125)>.
- “Aircraft operator hit with half a million euro EU ETS non-compliance penalty as EU states send out enforcement notices”, *GREENAIRonline.com* (24 February 2014), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1827](http://www.greenaironline.com/news.php?viewStory=1827)>.
- “Aviation emissions covered by the EU ETS edge higher in 2014 to over 54 MtCO2 as emissions from other sectors fall”, *GREENAIRonline.com* (17 April 2015), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2072](http://www.greenaironline.com/news.php?viewStory=2072)>.
- “Boeing Dreamliner makes emergency landing during test flight”, *CNN* (9 November 2010), online: CNN <[www.cnn.com/2010/US/11/09/boeing.dreamliner.emergency/index.html](http://www.cnn.com/2010/US/11/09/boeing.dreamliner.emergency/index.html)>.
- “Boeing: 15 airlines warned over high-altitude ice”, *BBC News* (23 November 2013), online: BBC News <[www.bbc.co.uk/news/business-25068222](http://www.bbc.co.uk/news/business-25068222)>.
- “BRICS, United States and others join in Delhi declaration to oppose EU’s imposition of ETS on their airlines”, *GREENAIRonline.com* (3 October 2011), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1344](http://www.greenaironline.com/news.php?viewStory=1344)>.
- “China threat over EU airline emissions trading”, *BBC News* (6 June 2011), online: BBC News <[www.bbc.com/news/business-13668567](http://www.bbc.com/news/business-13668567)>.
- “Chinese and Indian airlines come into compliance with EU ETS as Swiss case moves to EU’s highest court”, *GREENAIRonline.com* (19 May 2015), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2084](http://www.greenaironline.com/news.php?viewStory=2084)>.
- “End of an era for Concorde”, *BBC News* (24 October 2003), online: BBC News <[news.bbc.co.uk/2/hi/uk\\_news/3211053.stm](http://news.bbc.co.uk/2/hi/uk_news/3211053.stm)>.
- “EU proposal to unilaterally regulate international flights in EU ETS puts global scheme at risk, says ‘shocked’ IATA”, *GREENAIRonline.com* (20 December 2013), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1803](http://www.greenaironline.com/news.php?viewStory=1803)>.
- “EU States tread warily on naming and shaming Aircraft Operators that have failed to comply with EU ETS Rules”, *GREENAIRonline.com* (15 December 2014), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2021](http://www.greenaironline.com/news.php?viewStory=2021)>.
- “German Air Passenger Departure Tax linked to Environmental Performance draws Airline Protests”, *GREENAIRonline.com* (9 June 2010), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1128](http://www.greenaironline.com/news.php?viewStory=1128)>.
- “Germany fines Aircraft Operators \$5.9 million as it publishes first Aviation EU ETS non-compliance list”, *GREENAIRonline.com* (5 March 2015), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=2054](http://www.greenaironline.com/news.php?viewStory=2054)>.

- “ICAO appoints 17 countries to new High-level Group to hammer out important policy issues on aviation MBMs”, *GREENAIRonline.com* (28 November 2012), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=1626](http://www.greenaironline.com/news.php?viewStory=1626)>.
- “Japan Airlines review finds fuel leak from 787”, *CNN Travel* (14 January 2013), online: CNN <[www.cnn.com/2013/01/13/travel/dreamliner-problems/index.html](http://www.cnn.com/2013/01/13/travel/dreamliner-problems/index.html)>.
- “Netherlands and Germany fine foreign airlines over ETS”, *Transport & Environment* (30 May 2014), online: Transport & Environment <[www.transportenvironment.org/news/netherlands-and-germany-fine-foreign-airlines-over-ets](http://www.transportenvironment.org/news/netherlands-and-germany-fine-foreign-airlines-over-ets)>.
- “Q&A: A380 delays”, *BBC News* (30 October 2006), online: BBC News <[news.bbc.co.uk/2/hi/business/5405524.stm](http://news.bbc.co.uk/2/hi/business/5405524.stm)>.
- “Qantas grounds Airbus A380 fleet after mid-air engine failure”, *CNN* (4 November 2010), online: CNN <[edition.cnn.com/2010/WORLD/asiapcf/11/04/indonesia.plane.emergency/index.html](http://edition.cnn.com/2010/WORLD/asiapcf/11/04/indonesia.plane.emergency/index.html)>.
- “Regulatory – Chinese Carriers Shun EU ETS Rules Warning; Signals Retaliation”, *Air Transport World* (17 May 2012), online: Aviainform <[www.aviainform.org/industrynews/14-industrynews/2205-regulatory-chinese-carriers-shun-eu-ets-rules-warning-signals-retaliation.html](http://www.aviainform.org/industrynews/14-industrynews/2205-regulatory-chinese-carriers-shun-eu-ets-rules-warning-signals-retaliation.html)>.
- “Russia’s Aeroflot to Appeal Environmental Fine for Flights Over Europe”, *Sputnik News* (25 July 2014), online: Sputnik International <[www.sputniknews.com/business/20140725/191246005/Russias-Aeroflot-to-Appeal-Environmental-Fine-for-Flights-Over.html](http://www.sputniknews.com/business/20140725/191246005/Russias-Aeroflot-to-Appeal-Environmental-Fine-for-Flights-Over.html)>.
- “Saudi Arabian Airlines fined \$1.6 million for breaking EU aviation law”, *Reuters* (18 May 2015), online: Reuters <[www.reuters.com/article/2015/05/18/eu-saudi-aviation-idUSL5N0Y63P120150518](http://www.reuters.com/article/2015/05/18/eu-saudi-aviation-idUSL5N0Y63P120150518)>.
- “Singapore Air grounds A380 again for pump fault”, *Reuters* (26 March 2008), online: Reuters <[www.reuters.com/article/2008/03/26/singapore-airlines-a-idUSSIN11028220080326](http://www.reuters.com/article/2008/03/26/singapore-airlines-a-idUSSIN11028220080326)>.
- “Singapore Airlines A380 plane in emergency landing”, *BBC News Business* (6 January 2014), online: BBC News <[www.bbc.co.uk/news/business-25618122](http://www.bbc.co.uk/news/business-25618122)>.
- “Three major US airlines and ATA file suit in London against UK Government over inclusion in EU ETS”, *GREENAIRonline.com* (18 December 2009), online: GREENAIR <[www.greenaironline.com/news.php?viewStory=702](http://www.greenaironline.com/news.php?viewStory=702)>.
- “Typhoon cancels dozens of flights in Japan”, *Japan Today* (26 July 2015), online: Japan Today <[www.japantoday.com/category/national/view/typhoon-cancels-dozens-of-flights-in-japan](http://www.japantoday.com/category/national/view/typhoon-cancels-dozens-of-flights-in-japan)>.
- “UN members agree deal at Lima climate talks”, *BBC News* (14 December 2014), online: BBC News <[www.bbc.com/news/science-environment-30468048](http://www.bbc.com/news/science-environment-30468048)>.
- “US rejects European Court ruling on airline emissions”, *BBC News* (21 December 2011), online: BBC News <[www.bbc.com/news/business-16282692](http://www.bbc.com/news/business-16282692)>.

#### ONLINE MATERIAL: BLOGS

- Cohen, Dave. “The “Lima Call For Action”” (16 December 2014), *Decline of the Empire* (blog), online: <[www.declineoftheempire.com/2014/12/the-lima-call-to-action.html](http://www.declineoftheempire.com/2014/12/the-lima-call-to-action.html)>.
- De Souza, Mike. “Stephen Harper’s climate change timeline” (19 September 2014), *Mike De Souza* (blog), online: <[mikedesouza.com/2014/09/19/stephen-harpers-climate-change-](http://mikedesouza.com/2014/09/19/stephen-harpers-climate-change-)

timeline/>.

Stavins, Robert. “Assessing the Outcome of the Lima Climate Talks” (14 December 2014), *An Economic View of the Environment* (blog), online: <[www.robertstavinsblog.org/2014/12/14/assessing-the-outcome-of-the-lima-climate-talks/](http://www.robertstavinsblog.org/2014/12/14/assessing-the-outcome-of-the-lima-climate-talks/)>.

#### ONLINE MATERIAL: WEB PAGES

A Fair Tax on Flying, “Get the Facts”, online: A Fair Tax on Flying <[www.afairtaxonflying.org/facts/](http://www.afairtaxonflying.org/facts/)>.

Air Transport Action Group, “Facts & Figures”, online: ATAG <[www.atag.org/facts-and-figures.html](http://www.atag.org/facts-and-figures.html)> (visited August 21, 2015).

Airbus, “A380”, online: Airbus <[www.airbus.com/aircraftfamilies/passengeraircraft/a380family/](http://www.airbus.com/aircraftfamilies/passengeraircraft/a380family/)> (visited August 8, 2015).

Airlines for America, “History”, online: Airlines for America <[www.airlines.org/about-us/history/](http://www.airlines.org/about-us/history/)>.

Airport Watch, “Air Passenger Duty”, online: Airport Watch <[www.airportwatch.org.uk/air-passenger-duty/](http://www.airportwatch.org.uk/air-passenger-duty/)>.

Association of Asia Pacific Airlines, “Profile”, online: AAPA <[aapairlines.org/Profile.aspx](http://aapairlines.org/Profile.aspx)>.

African Airlines Association, “Background”, online: AFRAA <[www.afraa.org/index.php/about-us/background](http://www.afraa.org/index.php/about-us/background)>.

BAR UK, “Air Passenger Duty (APD)”, online: BAR UK <[www.bar-uk.org/campaigns/apd/](http://www.bar-uk.org/campaigns/apd/)>.

Boeing, “787”, online: Boeing <[www.boeing.com/commercial/787/](http://www.boeing.com/commercial/787/)> (visited August 8, 2015).

Boeing, “About Boeing Commercial Airplanes: Prices”, online: Boeing <[www.boeing.com/company/about-bca/index.page%23/prices#/prices](http://www.boeing.com/company/about-bca/index.page%23/prices#/prices)>.

British Airways, “Celebrating Concorde”, online: British Airways <[www.britishairways.com/en-gb/information/about-ba/history-and-heritage/celebrating-concorde#flying](http://www.britishairways.com/en-gb/information/about-ba/history-and-heritage/celebrating-concorde#flying)>.

Civil Air Navigation Services Organisation, “About CANSO”, online: CANSO <[www.canso.org/about](http://www.canso.org/about)>.

David Suzuki Foundation, *Climate Change Deniers*, online: David Suzuki Foundation <[david Suzuki.org/issues/climate-change/science/climate-change-basics/climate-change-deniers/](http://david Suzuki.org/issues/climate-change/science/climate-change-basics/climate-change-deniers/)>.

Deutsche Emissionshandelsstelle (DEHSt), “Informationen zur Sanktionierung”, online: DEHSt <[www.dehst.de/SharedDocs/Boxen/DE/Sanktionsverfahren.html](http://www.dehst.de/SharedDocs/Boxen/DE/Sanktionsverfahren.html)>.

EU, “The history of the European Union”, online: EUROPA <[europa.eu/about-eu/eu-history/index\\_en.htm](http://europa.eu/about-eu/eu-history/index_en.htm)>.

EUROCONTROL, “Single European Sky”, online: EUROCONTROL <[www.eurocontrol.int/dossiers/single-european-sky](http://www.eurocontrol.int/dossiers/single-european-sky)>.

European Commission, “2020 climate & energy package”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/strategies/2020/index\\_en.htm](http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm)>.

European Commission, “2030 climate & energy framework”, online: European Commission Climate Action <[ec.europa.eu/clima/policies/strategies/2030/index\\_en.htm](http://ec.europa.eu/clima/policies/strategies/2030/index_en.htm)>.

European Commission, “Air: Climate Change”, online: European Commission Mobility and Transport <[ec.europa.eu/transport/modes/air/environment/climate\\_change\\_en.htm](http://ec.europa.eu/transport/modes/air/environment/climate_change_en.htm)>.

European Commission, “Aircraft operators and their administering Member States”, online: European Commission Climate Action

- [ec.europa.eu/clima/policies/transport/aviation/operators/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/aviation/operators/index_en.htm).
- European Commission, “Allocation of aviation allowances in an EEA-wide Emissions Trading System”, online: European Commission Climate Action [ec.europa.eu/clima/policies/transport/aviation/allowances/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/aviation/allowances/index_en.htm).
- European Commission, “Monitoring, reporting and verification of EU ETS emissions”, online: European Commission Climate Action [ec.europa.eu/clima/policies/ets/monitoring/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/monitoring/index_en.htm).
- European Commission, “Reducing emissions from aviation”, online: European Commission Climate Action [ec.europa.eu/clima/policies/transport/aviation/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/aviation/index_en.htm).
- European Commission, “Reducing emissions from the shipping sector”, online: European Commission Climate Action [ec.europa.eu/clima/policies/transport/shipping/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/shipping/index_en.htm).
- European Commission, “Structural reform of the European carbon market”, online: European Commission [ec.europa.eu/clima/policies/ets/reform/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/reform/index_en.htm).
- European Commission, “The EU Emissions Trading System (EU ETS): Policy”, online: European Commission Climate Action [ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm).
- European Free Trade Association, “European Economic Area”, online: EFTA [www.efta.int/eea](http://www.efta.int/eea).
- European Free Trade Association, “The Basic Features of the EEA Agreement”, online: EFTA [www.efta.int/eea/eea-agreement/eea-basic-features](http://www.efta.int/eea/eea-agreement/eea-basic-features).
- ICAO, “Aircraft Engine Emissions”, online: ICAO [www.icao.int/environmental-protection/Pages/aircraft-engine-emissions.aspx](http://www.icao.int/environmental-protection/Pages/aircraft-engine-emissions.aspx).
- ICAO, “Air Transport Bureau”, online: ICAO [www.icao.int/secretariat/air-transport/Pages/default.aspx](http://www.icao.int/secretariat/air-transport/Pages/default.aspx).
- ICAO, “Alternative Fuels: Questions and Answers: 7. What is ICAO Doing in the Field of Alternative Fuels?”, online: ICAO [www.icao.int/environmental-protection/Pages/AltFuel-IcaoAction.aspx](http://www.icao.int/environmental-protection/Pages/AltFuel-IcaoAction.aspx).
- ICAO, “Alternative Fuels: Question 7: What are the past and current achievements of ICAO in the field of alternative fuels?”, online: ICAO [www.icao.int/environmental-protection/Pages/AltFuels-Q7-3.aspx](http://www.icao.int/environmental-protection/Pages/AltFuels-Q7-3.aspx).
- ICAO, “Alternative Fuels: Questions and Answers 5. What are the Challenges for the Development and Deployment of Alternative Fuels?”, online: ICAO [www.icao.int/environmental-protection/Pages/AltFuels-Challenges.aspx](http://www.icao.int/environmental-protection/Pages/AltFuels-Challenges.aspx).
- ICAO, “Archived Meetings: High Level 2009”, online: ICAO [www.icao.int/Meetings/AMC/MA/Forms/AllItems.aspx?RootFolder=%2fMeetings%2fAMC%2fMA%2fHigh%20Level%202009&FolderCTID=0x0120008F5BD6E74225408C846CE885FC7730](http://www.icao.int/Meetings/AMC/MA/Forms/AllItems.aspx?RootFolder=%2fMeetings%2fAMC%2fMA%2fHigh%20Level%202009&FolderCTID=0x0120008F5BD6E74225408C846CE885FC7730).
- ICAO, “Assembly 38th Session: Reference Documents”, online: ICAO [www.icao.int/Meetings/a38/Pages/documentation-reference-documents.aspx](http://www.icao.int/Meetings/a38/Pages/documentation-reference-documents.aspx).
- ICAO, “Assembly 38th Session: Working Papers by Agenda Item”, online: ICAO [www.icao.int/Meetings/a38/Pages/WP\\_Agenda.aspx](http://www.icao.int/Meetings/a38/Pages/WP_Agenda.aspx).
- ICAO, “Climate Change: Programme of Action”, online: ICAO [www.icao.int/environmental-protection/Pages/programme-of-action.aspx](http://www.icao.int/environmental-protection/Pages/programme-of-action.aspx).
- ICAO, “Committee on Aviation Environmental Protection (CAEP)”, online: ICAO [www.icao.int/environmental-protection/Pages/Caep.aspx](http://www.icao.int/environmental-protection/Pages/Caep.aspx).
- ICAO, “Contaminants”, online: ICAO [www.icao.int/environmental-](http://www.icao.int/environmental-)

- protection/Pages/Contaminants.aspx>.
- ICAO, “Council States 2014-2016”, online: ICAO <[www.icao.int/about-icao/Pages/council-states-2014-2016.aspx](http://www.icao.int/about-icao/Pages/council-states-2014-2016.aspx)>.
- ICAO, “Environment Branch: Committee on Aviation Environmental Protection (CAEP)”, online: ICAO <[www.icao.int/publications/Pages/Caep.aspx](http://www.icao.int/publications/Pages/Caep.aspx)>.
- ICAO, “Environmental Protection: Statements”, online: ICAO <[www.icao.int/environmental-protection/Pages/statements.aspx](http://www.icao.int/environmental-protection/Pages/statements.aspx)>.
- ICAO, “Global Aviation Dialogues (GLADs)”, online: ICAO <[www.icao.int/meetings/GLADs-2015/Pages/default.aspx](http://www.icao.int/meetings/GLADs-2015/Pages/default.aspx)>.
- ICAO, “How It Works”, online: ICAO <[www.icao.int/about-icao/pages/how-it-works.aspx](http://www.icao.int/about-icao/pages/how-it-works.aspx)>.
- ICAO, “ICAO Strategic Objectives 2014–2016”, online: ICAO <[www.icao.int/about-icao/Pages/Strategic-Objectives.aspx](http://www.icao.int/about-icao/Pages/Strategic-Objectives.aspx)>.
- ICAO, “Market-Based Measures”, online: ICAO <[www.icao.int/environmental-protection/Pages/market-based-measures.aspx](http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx)>.
- ICAO, “Operational Measures”, online: ICAO <[www.icao.int/environmental-protection/Pages/operational-measures.aspx](http://www.icao.int/environmental-protection/Pages/operational-measures.aspx)>.
- ICAO, “PBN iKit”, online: ICAO <[www.icao.int/safety/pbn/PBNiKitV3/story.html](http://www.icao.int/safety/pbn/PBNiKitV3/story.html)>.
- ICAO, “Performance Based Navigation: Overview”, online: ICAO <[www.icao.int/safety/pbn/Pages/Overview.aspx](http://www.icao.int/safety/pbn/Pages/Overview.aspx)>.
- ICAO, “Reservations to Resolution A37/19 (17/2)”, online: ICAO <[www.icao.int/Meetings/AMC/Assembly37/Documents/ReservationsResolutions/10\\_reservations\\_en.pdf](http://www.icao.int/Meetings/AMC/Assembly37/Documents/ReservationsResolutions/10_reservations_en.pdf)>.
- ICAO, “Reservations to Resolution A38-18 (17/2)”, online: ICAO <[www.icao.int/Meetings/a38/Pages/resolutions.aspx](http://www.icao.int/Meetings/a38/Pages/resolutions.aspx)>.
- ICAO, “Technical Cooperation Bureau: Who we are”, online: ICAO <[www.icao.int/secretariat/TechnicalCooperation/Pages/Whoweare.aspx](http://www.icao.int/secretariat/TechnicalCooperation/Pages/Whoweare.aspx)>.
- ICAO, “Technology Standards”, online: ICAO <[www.icao.int/environmental-protection/Pages/technology-standards.aspx](http://www.icao.int/environmental-protection/Pages/technology-standards.aspx)>.
- ICAO, “The Universal Security Audit Programme Continuous Monitoring Approach (USAP-CMA) and its Objective”, online: ICAO <[www.icao.int/Security/USAP/Pages/default.aspx](http://www.icao.int/Security/USAP/Pages/default.aspx)>.
- ICAO, “USOAP Continuous Monitoring Approach”, online: ICAO <[www.icao.int/safety/CMAForum/Pages/default.aspx](http://www.icao.int/safety/CMAForum/Pages/default.aspx)>.
- ICAO, “Vision & Mission”, online: ICAO <[www.icao.int/about-icao/Pages/vision-and-mission.aspx](http://www.icao.int/about-icao/Pages/vision-and-mission.aspx)>.
- ICAO, “WG3: Emissions”, online: ICAO <[www.icao.int/environmental-protection/Documents/CAEP/Images/WG3-Large.png](http://www.icao.int/environmental-protection/Documents/CAEP/Images/WG3-Large.png)> (visited July 29, 2015).
- IMO, “Air Pollution, Energy Efficiency and Greenhouse Gas Emissions”, online: IMO <[www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Default.aspx](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Default.aspx)>.
- IMO, “Market-Based Measures”, online: IMO <[www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx)>.
- International Air Transport Association, “Airlines”, online: IATA <[www.iata.org/Pages/airlines.aspx](http://www.iata.org/Pages/airlines.aspx)>.
- International Air Transport Association, “Home”, online: IATA



<[www.iata.org/Pages/default.aspx](http://www.iata.org/Pages/default.aspx)>.

International Air Transport Association, “IATA Carbon Offset Program”, online: IATA <[www.iata.org/whatwedo/environment/Pages/carbon-offset.aspx](http://www.iata.org/whatwedo/environment/Pages/carbon-offset.aspx)>.

International Air Transport Association, “Improving Environmental Performance”, online: IATA <[www.iata.org/whatwedo/environment/pages/index.aspx](http://www.iata.org/whatwedo/environment/pages/index.aspx)>.

International Law Commission, “Sixty-fifth Session (2013)”, online: International Law Commission <[legal.un.org/ilc/sessions/65/](http://legal.un.org/ilc/sessions/65/)>.

Intergovernmental Panel on Climate Change, “History”, online: IPCC <[www.ipcc.ch/organization/organization\\_history.shtml](http://www.ipcc.ch/organization/organization_history.shtml)>.

Intergovernmental Panel on Climate Change, “Organization”, online: IPCC <[www.ipcc.ch/organization/organization.shtml](http://www.ipcc.ch/organization/organization.shtml)>.

International Coalition for Sustainable Aviation, “Home”, online: ICSA <[www.icsa-aviation.org/](http://www.icsa-aviation.org/)>.

National Airlines Council of Canada, “Home”, online: National Airlines Council of Canada <[www.airlinecouncil.ca/](http://www.airlinecouncil.ca/)>.

NAV Canada, “About Us”, online: NAV Canada <[www.navcanada.ca/en/about-us/Pages/default.aspx](http://www.navcanada.ca/en/about-us/Pages/default.aspx)>.

NZ Ministry for the Environment, “Climate change impacts in New Zealand”, online: New Zealand Ministry for the Environment <[www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/climate-change-impacts](http://www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/climate-change-impacts)>.

Rio+20: United Nations Conference on Sustainable Development, “The History of Sustainable Development in the United Nations”, online: Rio+20: United Nations Conference on Sustainable Development <[www.uncsd2012.org/history.html](http://www.uncsd2012.org/history.html)>.

Skeptical Science, “What do the 'Climategate' hacked CRU emails tell us?”, online: Skeptical Science <[www.skepticalscience.com/Climategate-CRU-emails-hacked-intermediate.htm](http://www.skepticalscience.com/Climategate-CRU-emails-hacked-intermediate.htm)>.

The Health and Environment Linkages Initiative (HELI), “Climate Change”, online: World Health Organization <[www.who.int/heli/risks/climate/climatechange/en/](http://www.who.int/heli/risks/climate/climatechange/en/)>.

UN and Climate Change, “Towards a Climate Agreement”, online: UN <[www.un.org/climatechange/towards-a-climate-agreement/](http://www.un.org/climatechange/towards-a-climate-agreement/)>.

UN Economic Commission for Europe, “Protocols”, online: UNECE <[www.unece.org/fr/env/lrtap/status/lrtap\\_s.html](http://www.unece.org/fr/env/lrtap/status/lrtap_s.html)>.

UN Economic Commission for Europe, “The Convention: The 1979 Geneva Convention on Long-range Transboundary Air Pollution”, online: UNECE <[www.unece.org/fr/env/lrtap/lrtap\\_h1.html](http://www.unece.org/fr/env/lrtap/lrtap_h1.html)>.

UNEP, “About UNEP”, online: UNEP <[www.unep.org/about/](http://www.unep.org/about/)>.

UNEP, Ozone Secretariat, “The Vienna Convention for the Protection of the Ozone Layer”, online: UNEP <[ozone.unep.org/new\\_site/en/vienna\\_convention.php](http://ozone.unep.org/new_site/en/vienna_convention.php)>.

UNEP, Ozone Secretariat, “Treaties and Decisions”, online: UNEP <[ozone.unep.org/en/treaties.php](http://ozone.unep.org/en/treaties.php)>.

UNFCCC, “Cancun Agreements”, online: UNFCCC <[unfccc.int/meetings/cancun\\_nov\\_2010/items/6005.php](http://unfccc.int/meetings/cancun_nov_2010/items/6005.php)>.

UNFCCC, “Clean Development Mechanism (CDM)”, online: UNFCCC <[unfccc.int/kyoto\\_protocol/mechanisms/clean\\_development\\_mechanism/items/2718.php](http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php)>.

UNFCCC, “Documents & Decisions”, online: UNFCCC

<unfccc.int/documentation/decisions/items/3597.php?such=j&volltext=%22cancun%20agreements%22>.

UNFCCC, “Emissions from fuel used for international aviation and maritime transport (international bunker fuels)”, online: UNFCCC <unfccc.int/methods/emissions\_from\_intl\_transport/items/1057.php>.

UNFCCC, “Intended Nationally Determined Contributions (INDCs)”, online: UNFCCC <unfccc.int/focus/indc\_portal/items/8766.php>.

UNFCCC, “International Emissions Trading”, online: UNFCCC <unfccc.int/kyoto\_protocol/mechanisms/emissions\_trading/items/2731.php>.

UNFCCC, “Introduction: An Introduction to the Kyoto Protocol Compliance Mechanism”, online: UNFCCC <unfccc.int/kyoto\_protocol/compliance/items/3024.php>.

UNFCCC, “Joint Implementation (JI)”, online: UNFCCC <unfccc.int/kyoto\_protocol/mechanisms/joint\_implementation/items/1674.php>.

UNFCCC, “Kyoto Protocol”, online: UNFCCC <unfccc.int/kyoto\_protocol/items/2830.php>.

UNFCCC, “List of Annex I Parties to the Convention”, online: UNFCCC <unfccc.int/parties\_and\_observers/parties/annex\_i/items/2774.php>.

UNFCCC, “List of Non-Annex I Parties to the Convention”, online: UNFCCC <unfccc.int/parties\_and\_observers/parties/non\_annex\_i/items/2833.php>.

UNFCCC, “Parties & Observers”, online: UNFCCC <unfccc.int/parties\_and\_observers/items/2704.php>.

UNFCCC, “Party Groupings”, online: UNFCCC <unfccc.int/parties\_and\_observers/parties/negotiating\_groups/items/2714.php>.

UNFCCC, “Status of Ratification of the Convention”, online: UNFCCC <unfccc.int/essential\_background/convention/status\_of\_ratification/items/2631.php> (visited July 30, 2015).

UNFCCC, “Status of Ratification of the Kyoto Protocol”, online: UNFCCC <unfccc.int/kyoto\_protocol/status\_of\_ratification/items/2613.php>.

Zurich Airport, “Charges”, online: Zurich Airport <www.zurich-airport.com/business-and-partners/flight-operations/charges>.

“Effects of Global Warming: Signs Are Everywhere”, *National Geographic*, online: National Geographic <environment.nationalgeographic.com/environment/global-warming/gw-effects/>.

“What Is Global Warming?: The Planet Is Heating Up—and Fast”, *National Geographic*, online: National Geographic <environment.nationalgeographic.com/environment/global-warming/gw-overview>.

Online: The Prisoner’s Dilemma <www.prisoners-dilemma.com/>.

Online: UN Treaty Collection <treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\_no=XXVII-7-c&chapter=27&lang=en> (visited August 20, 2015).

Online: UN Treaty Collection <treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\_no=XXVII-1&chapter=27&lang=en>.

Online: UN Treaty Collection <treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\_no=XXVII-2&chapter=27&lang=en>.

\*\*\*\*\*

THE END