

Valuing the Contributions of Nonstate and Subnational Actors to Climate Governance

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Abstract

Nonstate and subnational climate governance activities are proliferating. Alongside them are databases and registries that attempt to calculate their contributions to global decarbonization. We label these registries “orchestration platforms” because they both aggregate disparate initiatives and attempt to steer them toward overarching objectives such as improved transparency, accountability, and effectiveness. While well-intentioned, many orchestration platforms adopt a narrow conception of “value” as either quantifiable greenhouse gas (GHG) reductions or relevant outputs. We offer a more comprehensive approach to valuing nonstate and subnational climate governance that is rooted in recognizing the potential for initiatives to become far-reaching (i.e., achieve scale) and durable (i.e., become entrenched). We illustrate the comparative advantage of our approach with reference to a particular case of nonstate governance: The Carbon Trust’s attempt to create product carbon footprints. By tracing the direct and indirect impacts of product carbon footprinting, we show that initial failures to generate quantifiable GHG reductions or produce relevant outputs do not reflect the intervention’s broader impacts through scaling to other jurisdictions and entrenching business practices that contribute to decarbonization. Taking this broader view of “value” can help policy-makers better understand and gauge the contribution of nonstate and subnational climate governance to global decarbonization.

The twenty-first Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 21) sparked renewed optimism in the multilateral climate regime. However, this optimism was quickly tempered by the sober recognition that even if all the signatories to the Paris Agreement fulfill their Intended Nationally Determined Contributions (INDCs), a gap would

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remain between projected greenhouse gas (GHG) emissions and the reductions required to stabilize global mean temperature increase below the agreed-upon two-degree-Celsius threshold (UNEP 2015a). A growing community of scholars and policy-makers look to the “groundswell” of nonstate and subnational (NSS) climate governance—a category that includes decarbonization “interventions”¹ by cities, subnational governments, hybrid public-private partnerships, corporations, investors, transnational networks, and nongovernmental organizations (NGOs)²—to narrow this emissions gap (Chan et al. 2015b; Hsu et al. 2015; UNEP 2015a).³ A key question in the wake of Paris is: how much can these interventions actually contribute to global decarbonization efforts beyond the INDCs?

In an effort to address this question, a range of online databases and registries have emerged to aggregate and value the cumulative impact of NSS climate governance. We call these registries “orchestration platforms” insofar as they represent purposive efforts by international organizations (IOs) and other transnational actors to coordinate, mobilize, and value the contributions of private, hybrid, and subnational actors, in effect enlisting them as intermediaries to achieve defined regulatory goals (Abbott and Snidal 2010). Orchestration platforms employ a range of valuation methods, from quantifying achieved GHG reductions to assessing outputs against intended functions. While well-intentioned and ostensibly apolitical, these valuation methods ultimately conceptualize “value” too narrowly and thus risk drawing false inferences about the merits of some NSS interventions. Moreover, such platforms have (at least) two seemingly contradictory political impacts. First, they have the potential to depoliticize NSS climate governance by overlooking its contributions toward the broader, and often contentious, transformations required to achieve global decarbonization. Second, they are fundamentally political constructions in that they favor some approaches over others, creating winners and losers, and shifting the resources and energy of global climate governance into particular channels (see, e.g., Gordon 2016).

As a corrective, we propose a more encompassing approach to valuing NSS climate governance that examines an intervention’s potential to contribute to transformative change. We focus specifically on an intervention’s capacity to scale up and become entrenched in social, political, and economic institutions. While our approach is more research-intensive, it better enables researchers and policy-makers to account for the indirect and nonquantifiable impacts, both

1. We use the term “intervention” in the sense that NSS governance activities intervene with existing policies, practices, or institutions that are locked into fossil fuel dependence.
2. We recognize that “NSS” is a bit of a misnomer, but we use the term because “nonstate and substate” is a common short form used to cover the wide range of activities not traditionally accounted for by multilateral arrangements.
3. Many INDCs include expected emissions reductions from such efforts in their targets. However, NSS governance also often produces reductions that are not captured in formal national commitments.

positive and negative, of NSS interventions, including the ways in which they can precipitate ripple effects that lead to durable and far-reaching changes, or, conversely, produce quantifiable impacts that fizzle or even lead to negative ripple effects. It also avoids the common pitfall of valuing NSS climate governance by simply counting potential emission reductions, since failures to scale and entrench will often lead such approaches to inaccurate estimates.

We begin by outlining extant approaches to valuing NSS climate governance and provide a critique based on what these approaches omit. We then outline our own approach to valuing NSS climate governance, focusing on diverse pathways to scaling and entrenchment. Next, we illustrate the comparative advantage of our approach by applying it to a particular intervention: product carbon footprinting. We conclude with some thoughts on how orchestration platforms can adapt to better value the contribution of NSS climate governance.

Extant Approaches to Valuing NSS Climate Governance

NSS climate governance has exploded in recent years and has contributed to an increasingly fragmented governance landscape (Zelli and van Asselt 2013). In response, IOs have deliberately turned to orchestration to reassert their role and steer NSS governance toward internationally agreed-upon goals and principles (Abbott et al. 2015). A number of climate governance orchestration platforms have emerged. Chief amongst these is the Lima Paris Action Agenda and the accompanying Non-State Actor Zone for Climate Action (NAZCA) Portal launched by the Peruvian Presidency of COP 20 and the UNFCCC to “progressively showcase the extraordinary range of actions being undertaken by thousands of cities, investors and corporations” (UNEP 2015b, 1). In addition to its documentation role, NAZCA steers its participants through registration criteria that require interventions to set goals in line with those of the UNFCCC, specify quantifiable targets, and uphold broad democratic principles like inclusiveness (UNFCCC 2016).

Outside of the UN system, a range of civil society and hybrid public-private orchestration platforms have emerged. Ecofys, in partnership with the University of Cambridge, the World Resource Institute, and the Nordic Council of Ministers launched the Climate Initiatives Platform in 2014 to collect, share, and track 184 international climate initiatives involving roughly 20,782 diverse participants (Climate Initiatives Platform 2015). A research team at the German Development Institute and the London School of Economics developed the Global Aggregator for Climate Actions (GAFCA), a database intended to create “the foundation for a long-term systematic examination of climate actions that can inform more effective efforts to strengthen such actions” (Chan et al. 2015a, 2). More recently, researchers from Cambridge, Oxford, Yale, and several environmental NGOs formed a group called Galvanizing the Groundswell of Climate Actions (GGCA), whose mission includes “improving analysis and understanding of ‘bottom-up’ climate actions” and “building a positive narrative of

pragmatic, concrete action on climate change" (GGCA 2015). These overarching platforms exist alongside more narrow ones that focus on specific categories of NSS climate governance, such as action by local governments (e.g., the carbonn Climate Registry).

While orchestration platforms have successfully documented the expansion of climate governance and are a focal point for emergent research on "linkages" between multilateral and NSS governance (Betsill et al. 2015), exactly what the "groundswell" can contribute to global decarbonization remains the subject of some debate (Jordan et al. 2015). Skeptics are quick to point out that nearly 300 nonstate and public-private partnerships were launched at the 2002 World Summit on Sustainable Development in Johannesburg, yet few produced any discernible outcomes (Chan et al. 2015b). Studies have variously attributed their failures to a lack of clear quantifiable goals; inadequate monitoring, review, or evaluation mechanisms; and a paucity of partnerships specifically geared toward the implementation of intergovernmental commitments (Bäckstrand and Kylsäter 2014).

More recently, the Rio+20 Summit initially generated more than 700 voluntary commitments from a range of organizations—and more than 2,100 commitments since—on a wide range of sustainability concerns, yet few of these commitments were accompanied by accountability mechanisms (Hsu et al. 2015, 502; United Nations 2016). Even as recently as the 2014 New York Climate Summit, the commitments made by various NSS actors lacked hard emissions reduction goals, targets, or base years (Hsu et al. 2015, 501). The ambiguity of current NSS commitments and the failure of past interventions to generate tangible outcomes (at least of the kind sought and measured by IOs and their state patrons) have led skeptics to worry that NSS interventions may actually contribute very little while preventing stricter domestic regulations and leading to lowered ambition in international negotiations (Chan and Pauw 2014). These concerns resonate with the growing attention of scholars and practitioners to a perceived accountability deficit in global environmental politics (Kramarz and Park 2016; Mason 2008). In light of this perceived deficit, scholars, IOs, and civil society groups are increasingly searching for reliable metrics with which to value the contribution of NSS climate governance (Mosteller and Hsu 2015; UNEP 2015b, vi).

Different orchestration platforms currently champion a number of valuation approaches. One school of thought holds that NSS interventions should set clear, identifiable goals and be evaluated on their progress toward these goals (Widerberg and Pattberg 2015). Wherever possible, these goals should be expressed in terms of quantifiable GHG reductions, because "quantifying the emission reduction contribution these initiatives can (or are likely to) make is now critically important to understanding their overall impact on international climate mitigation efforts" (UNEP 2015b, vi). Under this approach, the value of a NSS intervention can be ascertained by whether it succeeds or fails to achieve its declared goals or emissions reduction target.

Others suggest following Easton's (1965) concept of effectiveness in systems analyses, wherein value is gauged according to outputs, outcomes, and impacts (Chan and Pauw 2014, 33). Chan et al. (2015a, 45) employ function-output-fit (FOF), a measure that determines whether outputs are consistent with self-declared functions. Using this metric, a NSS intervention that declares training as its primary function would be deemed valuable if it produced outputs like seminars or curricular programs (Chan et al. 2015a, 45). By contrast, one that generated outputs that do not align with its declared function would be deemed less valuable.

While the declared goal of these metrics is to value the cumulative impact of NSS governance and to "allow aggregate analysis, systematic tracking of climate actions, and the drawing of lessons learnt" (Chan et al. 2015a, 4), they are also intended to help separate superficial governance efforts from credible ones and "to monitor and verify [NSS governance] progress (with the possibility to deregister non-communicating or underperforming initiatives)" (Chan and Pauw 2014, 36). For this reason, orchestration platforms are more political than their benign appearance suggests. Their approach to valuation creates both winners and losers by helping individuals, investors, and policy-makers decide which interventions warrant further support and which do not. Functioning orchestration platforms fundamentally channel governance efforts in particular directions (Gordon 2016), but can potentially do so in a way that obfuscates the political stakes in their technocratic decisions.

Extant approaches also risk employing an overly narrow conception of "value," potentially reducing decarbonization to a problem of making the numbers add up. Leaving aside the thorny issues of the accuracy of business-as-usual projections, the credibility of data and emission factors, and the avoidance of double-counting, attempts to quantify the decarbonization achievements of NSS climate governance misrepresent the central problem posed by carbon lock-in (Unruh 2000) and suggest that the principal value of NSS climate governance is the achievement of GHG reduction targets.

The challenge posed by decarbonization is bigger than pulling a set number of gigatons of CO₂ equivalent (CO₂e) out of the atmosphere. Meeting the levels of GHG reductions required to avert catastrophic climate change—and then sustaining these levels—requires disrupting carbon lock-in through the wholesale transformation of established economic, social, technological, and governance institutions (Unruh 2000; Unruh 2002). Decarbonization interventions must therefore be evaluated not just against the volume of GHG emissions they reduce, but also against how much they contribute to broader transformations in key institutions.

Key attributes of NSS governance are diversity and dynamism. These interventions are often experimental in nature (Hoffmann 2011), and their key effects are likely to be catalytic and political—contributing to normative change, building the capacities of political actors, and altering the coalition-building and conflict dynamics that are at the heart of efforts to disrupt carbon lock-in

and pursue decarbonization (Bernstein and Hoffmann 2016). Valuation metrics that focus on immediately measurable outputs and outcomes may not only fail to account for these political effects, but also have the potential to stymie the underlying diversity and dynamism of NSS climate governance. “Weak” performance on existing metrics may lead policy-makers to prematurely abandon good ideas because of short-term failures to “measure up.” Thus, while we agree with the goal of setting quantifiable targets as a means of making NSS climate governance more accountable and coordinating action across multiple scales, we urge caution in assessing the potential of interventions *solely* by examining their performance against intended goals, reduction targets, or relevant outputs. Rather, the valuation approaches employed by orchestration platforms would do better to refocus their efforts on monitoring the effects of interventions over time and evaluating feedbacks and catalytic impacts.⁴

A New Approach to Valuing NSS Climate Governance

Our expanded approach to valuing NSS climate governance is premised on three assumptions. First, we assume that NSS governance interventions are connected in complex ways: action in one area or at one scale can, and often does, create ripple effects in other areas/scales. The effects of interventions can be non-linear and can extend beyond the bounds of the original intervention. The non-linear trajectory of carbon markets is an illustrative example. While the Kyoto Protocol (KP) included support for emissions trading, an international system never developed, with the exception of the Clean Development Mechanism. However, the KP did inspire the advent of voluntary carbon markets in the private sector, the EU Emissions Trading System, and a host of substate and regional schemes. Despite the replacement of the KP model of negotiating targets and implementing instruments internationally by a more bottom-up approach in the Paris Agreement, carbon markets (especially emission trading systems) are proliferating as an institutional form or policy instrument in countries and regions around the world (IETA 2016). They have arguably, as a result, gained renewed support in UNFCCC negotiations and outcomes, further supporting their scaling up. Similarly, innovative governance practices at the municipal or subnational level have occasionally led to changes in national and international climate policy (e.g. Betsill and Bulkeley 2006; Gordon 2013; Koehn 2008).

Decarbonization interventions must therefore be seen not only as targeting a particular system (whether a political jurisdiction, market sector, or set of practices), but also as potentially affecting other carbon locked-in systems (i.e., other jurisdictions, sectors, or related practices), since carbon lock-in is a wider,

4. Chan et al. (2015b) discuss the need for accountability mechanisms that are catalytic as well as regulative.

multilevel, multiscale phenomenon (Bernstein and Hoffmann 2016). Thus, for decarbonization to occur at a scale necessary to avoid the worst effects of climate change, carbon lock-in must be disrupted at multiple scales and in multiple systems. While recognizing the multiscale nature of decarbonization may make achieving it appear more daunting, it also implies that change at one level can result in changes at multiple levels.

Second, we assume that NSS interventions often contribute value that is nonquantifiable. Value does not always come in the form of direct GHG reductions or explicitly quantifiable outputs; it is often inherent in the way an intervention disrupts carbon lock-in within key social, political, or economic institutions. Reduced GHG emissions are only the last link in a causal chain that leads to decarbonization. Put differently, a reduction in GHG emissions is the observable outcome of some prior causal sequence. This sequence can involve the operation of diverse political mechanisms, including the normalization of carbon-reducing behaviors, building new capacities for GHG reductions, or constructing novel political coalitions (Bernstein and Hoffmann 2016). Significantly, these political mechanisms arise despite being outside the direct function of an intervention, and often produce outcomes that extend beyond the intervention's immediate goals. For example, the architects of voluntary carbon registries for businesses likely did not envision the emergence of novel coalitions of environmental groups and businesses advocating for better corporate carbon accounting, yet the development of these coalitions is one of the key outcomes of this intervention (Levin et al. 2012).

Catalytic consequences (intended and unintended), particularly those that lay the foundations for a broader societal transition to decarbonization, are therefore an important contribution of NSS climate governance. However, extant approaches to valuing NSS climate governance often miss these catalytic contributions, especially the unintended consequences, because they value the discrete setting of narrow quantifiable targets and/or the advancement of an intervention's predetermined function. In doing so, they risk missing the dynamic way in which interventions evolve and change, producing intended and unintended ripple effects.

Third, we assume that positive and negative feedbacks are possible and must be monitored over time to ascertain the direct and indirect effects of an intervention (Jordan and Matt 2014; Weaver 2010). Not all interventions that aim for decarbonization will achieve it (either through measureable GHG reductions or broader effects), and some may even make things worse—potentially contributing to long-term carbon lock-in while providing short-term emissions reductions or efficiency improvements. For example, in the case of Colorado's new energy economy, the planned shift from coal to renewables was sidetracked by the advent of fracking and the development of coalitions that supported a shift to natural gas. The "new energy economy" was subsequently redefined to include natural gas, thereby placing Colorado on an improved, but still carbon-intensive, post-intervention pathway (Betsill and Stevis 2016).

Taken together, these assumptions suggest a more comprehensive valuation of NSS climate governance, one that captures the potential for interventions to catalyze decarbonization at multiple scales and across multiple systems and is sensitive to both positive and negative feedbacks within and across systems. It must also capture the value of outcomes that are non-quantifiable or indirectly linked to the original intervention, but that nonetheless contribute to the overarching goal of transformative decarbonization.

This entails a challenging evaluation task that goes beyond counting GHG reductions and intended goal attainment. The question, then, is what observable indicators can researchers and policy-makers look for to determine whether broader measures of value are being achieved? Here we draw on past research that suggests using “applied forward reasoning” to analyze the value of policy responses (Bernstein et al. 2000). Like previous scholars who have used this approach, we argue that interventions must be measured against their capacity to “trigger and nurture path-dependent processes that lead to transformative change over time” (Levin et al. 2012, 131). Two processes in particular are critical for disrupting carbon lock-in and setting new, decarbonized path-dependent sequences in motion: scaling and entrenchment. To trigger new path dependencies that may lead to transformative change, interventions must demonstrate potential for both scaling (expanding the reach of their governance efforts and the audience affected) and entrenchment (generating substantive effects that are durable and difficult to reverse).

While scaling and entrenchment are not sufficient conditions for producing broad, transformative decarbonization outcomes, both increase the likelihood that such outcomes will occur.⁵ They are also processes that can be readily observed through careful qualitative research. Thus, researchers and policy-makers should examine how interventions have scaled and entrenched (or rigorously speculate how they could) before drawing conclusions about their value. To be clear, we are not suggesting the wholesale abandonment of approaches that value NSS interventions against quantifiable reduction targets or relevant outputs. Rather, a focus on scaling and entrenchment can act as a supplement to extant approaches, broadening accountability by monitoring and measuring impacts over time and across scales, and therefore providing a more comprehensive profile of an intervention’s contribution to decarbonization.

Recognizing and Accounting for Scaling and Entrenchment

Scaling and entrenchment occur in multiple guises. *Simple scaling* occurs when individual governance interventions expand their geographic scope, attract more members to their governance networks, or accumulate more resources. *Self-organized scaling* occurs when an intervention opens up political and economic

5. It stands to reason that an intervention that is both far-reaching and sustained holds a greater chance of yielding transformative decarbonization outcomes than does one that is fleeting and localized.

space for further interventions. These further interventions may remain clustered around the original and may reflect the emergence of a division of labor within the original intervention. *Cross-over scaling* occurs when an intervention motivates action in more conventional governance processes—for example, by precipitating changes in public policy. Finally, *modular scaling* occurs when an intervention is consciously replicated on a different scale or in a different geographic context. Modular scaling resembles policy diffusion, but it should be distinguished from mimesis, where similar interventions arise independently for reasons unconnected to the original intervention (DiMaggio and Powell 1983). All forms of scaling fundamentally amplify the impacts of an intervention across space.

Levin et al. (2012) elucidate multiple forms of entrenchment. Entrenchment through *lock-in* occurs when “a policy intervention contains a logic that gives it immediate durability” (Levin et al. 2012, 134). For example, domestic climate policy can be locked in if it requires a legislative supermajority to undo (Levin et al. 2012, 134). *Self-reinforcing* entrenchment occurs when the benefits for continuing and/or the costs of reversing an initiative increase over time (Levin et al. 2012, 135). For example, a city that switches to LED streetlighting will begin to realize increasing energy savings over time, making a return to incandescent bulbs undesirable. Coordination effects generated by *positive feedback* lead to entrenchment when those “who are not initially part of the target population make decisions to join, and by doing so, reinforce the choices of the original target populations” (Levin et al. 2012, 136). For example, the expanding number of companies reporting carbon emissions reinforces the commitment of early adopters of corporate carbon reporting.

While Levin et al. focus on the entrenchment of targeted policies or practices, we recognize *indirect entrenchment* of nontargeted policies or practices, as well. For example, the Carbon Disclosure Project began with the goal of increasing transparency around corporate GHG emissions to sway investors toward climate-friendly companies. As an indirect but durable outcome, carbon accounting triggered internal carbon pricing schemes in large multinationals like Microsoft that drew attention to energy consumption within the participating companies.⁶ Companies experienced increasing returns from the cost savings this process created, thereby amplifying the impact of the intervention in indirect and unanticipated ways.

Of course, when focusing on entrenchment processes, it is equally important to pay attention to counter-dynamics—when, for example, the targets of an intervention experience costs and organize against it (Aklin and Urpelainen 2013). Attention to both positive and negative dynamics, especially to the formation of counter-coalitions and entrenched norms, is especially important when analyzing indirect consequences in a forward-looking approach such as ours. Such awareness also provides an opportunity for analysis: attention to

6. *The New York Times*, September 27, 2015, BU3.

Table 1
Indicators of Scaling and Entrenchment in NSS Climate Governance

<i>Type of Scaling</i>	<i>Indicator: Has the intervention...</i>	<i>Type of Entrenchment</i>	<i>Indicator: Did the intervention...</i>
Simple	Attracted more members, expanded in geographic scope, or accumulated more resources?	Lock-in	Use mechanisms that gave it immediate durability?
Self-organized	Inspired symbiotic interventions?	Self-reinforcing	Become more difficult to reverse over time?
Cross-over	Changed conventional public policy?	Positive feedback	Attract nontarget members thereby reinforcing the decisions of early adopters?
Modular	Been consciously emulated in a different context?	Indirect	Catalyze indirect impacts that create decarbonization benefits?

these processes directs our gaze to opportunities that arise in seemingly unrelated initiatives that can indirectly create positive scaling and entrenchment dynamics for decarbonization.

The various processes of scaling and entrenchment outlined above are observable through careful qualitative analysis of individual interventions. In assessing the value of a particular NSS intervention, researchers can monitor the intervention to identify which, if any, of these processes are operative. There are no simple quantitative measures for these processes, but interventions can be assessed using a number of prompt questions, which we summarize in Table 1. Capturing the overall trajectory of changes produced by an intervention, in addition to applying output and outcome metrics, allows researchers to reach a more comprehensive account of an intervention’s value. This approach goes beyond quantifying GHG reductions and captures the overall potential of an intervention to catalyze transformative change. In the following section, we illustrate the utility of our approach with reference to the advent of product carbon footprinting by the Carbon Trust.

A Comparison of Approaches to Valuing Product Carbon Footprinting

The Carbon Trust is a UK-based organization created in 2001 as a government-sponsored nonprofit tasked with “accelerating the move to a sustainable, low

carbon economy" (Carbon Trust n.d.a). It gained international attention in 2008 for developing a standard and label for reporting the carbon footprints of products. The Carbon Trust Footprint label is a tiny black footprint that displays a numerical figure (in grams or kilograms of CO₂e), communicating the amount of GHG emissions associated with a product across its life cycle. The labels were originally intended to let environmentally conscious shoppers identify products with small carbon footprints, thereby stimulating demand for climate-friendly products and services.⁷ The intervention began with the explicit objective of mimicking the success of other market-based social and environmental certification systems, such as Fairtrade coffee and Dolphin Safe tuna. Its premise was that accurate information about product carbon footprints would steer consumers toward low-carbon products, thereby reducing carbon emissions. As Tom Delay, the head of the Carbon Trust, commented in 2008: "A carbon label will put the power in the hands of consumers to choose how they want to be green.... It will empower us all to make informed choices and in turn drive a market for low-carbon products."⁸

Product carbon footprints track GHG emissions in a single product from the raw material stage through manufacturing, distribution, use, and disposal/recycling (Carbon Trust 2008, 2). Footprinting demands a robust and consistent measurement system that integrates product life-cycle assessment with GHG emissions accounting. When the Carbon Trust began investigating product carbon footprinting, no such measurement system existed, so in 2006 it pioneered a methodology. In 2007–2008, the organization partnered with the British Standards Institution (BSI) and the Department for Environment, Food and Rural Affairs (DEFRA) to develop Publicly Available Specification (PAS) 2050 for measuring product life-cycle GHG emissions (Carbon Trust 2008, 2). Accompanying PAS 2050, the Carbon Trust also established a subsidiary (the Carbon Label Company) to help companies display their products' carbon footprint information consistently and credibly (Carbon Trust 2008, 7).

The intervention initially generated enthusiasm. In early evidence of simple scaling, the Carbon Trust secured high-profile corporate partners to pilot its carbon labels, including the supermarket Tesco, which pledged to label every one of its 70,000 products.⁹ However, the enthusiasm was short-lived. Corporate partners soon found the cost of product carbon footprinting (estimated at US\$ 30,000 per product) to be unsustainable.¹⁰ Moreover, the process of conducting a product carbon footprint was prohibitively lengthy, in some cases taking ten to twelve months for a single product.¹¹ These factors combined to stymie demand for carbon footprints before the intervention had scaled significantly in the UK. In 2012, Tesco abandoned its pledge, citing unsustainable

7. *The Economist*, June 2, 2011, available at www.economist.com/node/18750670.

8. *The New Yorker*, February 25, 2008, 44.

9. *The Economist*, June 2, 2011.

10. *The Economist*, June 2, 2011.

11. *Financial Times*, August 15, 2007, 9.

costs and insufficient take-up by other retailers.¹² A representative from Tesco noted that the label had “failed to have the desired impact with customers.”¹³

Applying extant approaches to valuing NSS climate governance, product carbon footprinting bears all the hallmarks of a failed intervention. Recall that in the most straightforward approach, an intervention holds value if it makes progress toward its declared goals (Widerberg and Pattberg 2015). In this case, the Carbon Trust declared a goal of steering consumer behavior toward low-carbon products and services.¹⁴ However, consumer awareness of product carbon footprints was (and remains) quite low. Whereas 90 percent of UK households bought a Carbon Trust–labeled product between 2007 and 2010 (Kazer 2013), only one in five British consumers recognized the carbon labels, versus four in five for Fairtrade and one in two for organic certifications.¹⁵ Moreover, a 2007 survey reported that 60 percent of respondents believed that corporate environmental claims were generally noncredible.¹⁶ Hence, the Carbon Trust never achieved its goal of shaping consumer behavior in a meaningful way.

When valued in terms of function-output-fit, product carbon footprinting also falls somewhat short. The theory of change employed by product carbon footprinting involved shifting consumer preferences toward low-carbon goods. To do so, the Carbon Trust needed to generate labels in a quantity sufficient to allow consumers to compare different products. It failed to do so. From 1,946 product carbon footprints in 2013/14, the annual number of new footprints fell to just 114 in the 2014/15 financial year (Carbon Trust 2014, 2015b, 20). In total, the Carbon Trust created 28,000 product carbon footprints (Carbon Trust 2015a). While this figure initially sounds impressive, its luster diminishes when one considers that a single retailer (e.g., Tesco) can have an inventory of over 70,000 products. As *The Guardian* astutely noted, at its 2012 rate of 125 products/year, it would take Tesco centuries to certify its entire inventory.¹⁷ Consequently, the level of output never matched the intended function of product carbon footprinting because the labels were not adopted widely enough to allow consumers to compare different product lines. As one skeptic commented: “how do I know if [a product’s] carbon footprint is any worse than that of other products if I can’t compare it?”¹⁸

Valued in terms of achieved GHG reductions, product carbon footprinting again appears to have had limited impact. While no fixed GHG reduction target was set for the intervention, the Carbon Trust as a whole was tasked with removing some 118 million metric tons (Mt) of CO₂e from the UK’s carbon budget

12. *The Guardian*, January 30, 2012, available at www.theguardian.com/environment/2012/jan/30/tesco-drops-carbon-labelling.

13. *The Times*, February 8, 2012, 22.

14. *The New Yorker*, February 25, 2008, 44.

15. *The Economist*, June 2, 2011.

16. *Financial Times*, August 15, 2007, 9.

17. *The Guardian*, January 30, 2012.

18. *Marketing Week*, 22 March 2011, available at <https://www.marketingweek.com/2011/03/22/meet-the-carbon-counters/>.

between 1990 and 2010 (National Audit Office 2007, 4). To date, the Carbon Trust estimates it has achieved roughly 60 Mt of lifetime carbon savings, but there is little evidence that these reductions came from product footprinting (Carbon Trust 2015b, 8). The majority of GHG reductions resulted from setting up new programs for foreign governments and advising public-sector bodies in the UK (Carbon Trust 2013, 2014). The Carbon Trust has reported no evidence of GHG reductions associated with product carbon footprinting; it only provides a figure for the number of footprints conducted in a year. Perhaps ominously, any quantifiable evidence of the impact of product carbon footprinting is absent from the 2014/15 Annual Report (Carbon Trust 2015b). In sum, relying on extant valuation approaches, product carbon footprinting appears to show a marginal contribution to decarbonization. It would therefore likely be deemed unworthy of ongoing support, as indeed it was in 2012.

A very different picture emerges, however, when scaling and entrenchment are added to the valuation approach. Approaching the Carbon Trust with an expanded understanding of value reveals that the intervention has scaled and entrenched in important ways. This leads us to conclude that product carbon footprinting has made catalytic contributions to decarbonization, albeit in indirect ways.

For a start, product carbon footprinting has demonstrated robust evidence of modular and cross-over scaling. While carbon labeling never gained a foothold in the UK, jurisdictions around the world have copied the Carbon Trust's pioneering footprinting methodology. In the three years following its release in 2008, users in 80 countries downloaded PAS 2050 35,000 times (BSI 2011). In France in 2009, public authorities began developing BP X 30-323, a product-level environmental footprinting standard that encompasses carbon emissions. While the 2007 Grenelle act first laid the legal basis for mandatory product environmental labeling, French Ministry of Sustainable Development officials explicitly note that they used the Carbon Trust's PAS 2050 as a starting point for developing their own standard (Vergez 2011, 11).

At roughly the same time, interventions with carbon footprinting began in Japan and Korea. In both cases, the methodology used to calculate product carbon footprints either directly copies or was inspired by the one pioneered by the Carbon Trust (Shi 2010). The Japanese Ministry of Economy, Trade and Industry began developing its own carbon footprint system in 2008 (Ikezuki 2009, 3), and the Korea Environmental Industry and Technology Institute (KEITI) introduced its carbon label in 2009. In September of 2008, DEFRA and the Ministry of the Environment in Japan signed a statement of cooperation regarding the exchange of information on calculating carbon footprints, and promised to cooperate on footprinting methodologies (Sharp and Terada 2008). KEITI and the Carbon Trust signed a similar memorandum of understanding in 2009 (KEITI 2009). The Japanese project subsequently expanded to cover roughly 495 products from over 100 companies, and the Korean project now covers over 360 unique products and services (JEMAI 2012; PEF World Forum 2011). These country-level interventions continued to diffuse outward, leading

to imitators in Thailand (2009) and Quebec (2012). In addition to national carbon-footprinting interventions, PAS 2050 also became the basis for a number of transnational carbon-footprinting standards, namely, the World Business Council for Sustainable Development and World Resources Institute's Product Life Cycle standard, and ISO 14067, a newly developed international standard for the quantification and communication of the carbon footprint of products. The ISO standard drew heavily on PAS 2050, and the Carbon Trust and BSI served as key stakeholders in its development (Carbon Trust 2008, 5).

While we cannot prove that the subsequent carbon-footprinting standards would not have arisen independently, the timeline and evidence suggest that the Carbon Trust pioneered the idea, and provided a model for labeling and a footprinting methodology that was either expanded upon or directly emulated by formal agreement in other jurisdictions. The Carbon Trust intervention was therefore integral to the development and timely deployment of similar schemes in other areas. Thus, if approaches to valuing product carbon footprinting include modular and cross-over scaling, it is possible to see the broader political impact of the intervention in terms of normalizing the idea that carbon emissions are relevant to consumers and providing the capacity for other governments to act by pioneering the product-level methodology. While these new carbon-footprinting initiatives may similarly fail to take hold or produce transformative decarbonization, it is clear that the Carbon Trust had an impact beyond its intended goals or targeted GHG reductions. This value is captured in our expanded valuation metric and allows for a broader discussion about the overarching contribution of product footprint labeling.

Similarly, when a focus on entrenchment is applied to the Carbon Trust intervention, we find evidence of durable impacts over time. Indirect entrenchment arose from the identification of hidden GHG emissions in corporate supply chains. While the original focus of the intervention was on shifting consumer behavior, the most durable impacts of product carbon footprinting may have occurred through changes in business behavior (Carbon Trust 2008, 4). In one typical example, carbon labeling led a potato chip manufacturer to a hitherto unexplored opportunity to save energy.¹⁹ Previously, the company had purchased potatoes by gross weight, leading farmers to store their potatoes in humidified sheds to increase their water content. As a result of the increased water content, the potato chip company had to fry its chips longer to get rid of the extra moisture, leading to higher energy usage and carbon emissions. The discovery that energy use during frying was a significant portion of the product's carbon footprint led the chip manufacturer to switch to buying potatoes by dry weight. This move reduced frying time by 10 percent, thereby saving the company energy, reducing carbon emissions, and saving farmers the cost of humidification. This experience is not unique to potato chips. Innocent Drinks, another participant

19. *The Economist*, June 2, 2011.

in the pilot project, observed that product carbon footprinting had allowed it “to identify lots of win-wins in improving our efficiency.”²⁰ These efficiency gains are the products of indirect and self-reinforcing entrenchment, since the participating companies were indirectly steered to durable lower-carbon production through product footprinting.

Product carbon footprinting has also led to durable changes in how firms engage with their supply chains. According to a 2013 report, the French carbon-footprinting pilot led 78 percent of participating companies to better understand their supply chain performance and enabled 50 percent of them to make effective improvements (Ernst and Young 2013, 4). Moreover, durable decarbonization behaviors are not only localized in the companies participating directly in carbon-footprinting pilots, but have rippled outward to include suppliers, thereby suggesting positive feedback entrenchment. Tesco’s carbon-labeling intervention led its suppliers to implement their own carbon reduction programs (Carbon Trust n.d.b). Another UK-based manufacturer has begun to hold “supplier summits” to foster a sense of cooperation and drive innovation amongst suppliers (Carbon Trust 2008, 4). These impacts are tangential to the original strategy of the intervention, which was to modify consumer behavior. Nonetheless, they represent a durable legacy of product carbon footprinting, and one that should be factored into any evaluation of its contributions.

Finally, carbon footprinting created non-quantifiable value by shifting thinking about how to mitigate corporate GHG emissions. The life-cycle approach adopted by product carbon-footprinting shifted attention away from production and toward different phases of a product’s life cycle. For example, Levi’s jeans found that 57 percent of the carbon footprint of its 501 jeans occurred during the usage phase, through machine washing in warm water and machine drying.²¹ This led Levi’s to redouble its efforts to shape consumer carbon behavior. In 2014, the CEO of Levi’s launched a vocal campaign to get consumers to stop washing their jeans so much.²² Hence, an indirect legacy of carbon footprinting is bringing emissions caused by usage into the analysis.

In sum, product carbon footprinting usefully illustrates the comparative advantage of our approach to valuing NSS climate governance. While the intervention failed to generate outputs or yield concrete emissions reductions in its target audience, it contributed to the broader goal of decarbonization in a number of significant but indirect ways. Modular scaling expanded the geographic reach of the intervention and helped normalize carbon-conscious consumption. Indirect entrenchment magnified the impact of the intervention over time and created durable changes in business behavior. The contribution of product carbon footprinting is therefore better captured by adopting a more encompassing approach to assessing value.

20. *Financial Times*, August 15, 2007, 9.

21. *The Economist*, June 2, 2011.

22. *Washington Post*, May 22, 2014, available at <https://www.washingtonpost.com/news/morning-mix/wp/2014/05/22/jeans-youre-doing-it-wrong-says-levis-chief-executive/>.

Conclusions

Efforts to aggregate and value the combined impacts of nonstate and subnational (NSS) climate governance are vital to encouraging the groundswell of decarbonization interventions. Toward this end, the emergence of orchestration platforms that perform these functions while also steering NSS governance toward overarching goals is an encouraging development. However, when valuing the contribution of NSS climate governance, these platforms should not adopt too narrow a conceptualization of “value.” Our case study illustrates the serious pitfalls of such an approach. The apparent failure of product carbon footprinting, driven by lack of uptake, high costs, and low consumer recognition, was counteracted by other impacts on ancillary practices, like improvements to supply chains and modular scaling. Hence, a single intervention can have influence through a myriad of different pathways, many of which are unintended and indirect.

How interventions are valued matters not only for monitoring the broader contribution of NSS climate governance, but also for deciding how scarce resources are allocated. The recent advent of environmental impact bonds, in which funding for an intervention is contingent on the production of verifiable results, means that reaching a comprehensive measure of value has never been more important (Balboa 2016). To illustrate this point, funding for the Carbon Trust was brutally slashed in 2012. While a range of factors precipitated the cuts, the UK government’s desire to deliver “maximum value for money” is explicitly noted as a rationale for shifting funds away from the Carbon Trust (DECC 2011, 9).

The drive to value climate interventions, by orchestration platforms as well as by other actors, is a justifiable response to a shift in what counts as climate change governance—in particular, the emergence of NSS governance alongside multilateral efforts. Our central argument has been, however, that this shift requires something more than applying the extant valuation approaches and accountability mechanisms used in multilateral settings. Such approaches essentially ask actors to define emissions reduction commitments and account for whether they achieve them. This method is unlikely to capture the full effects of NSS climate governance (both positive and negative), particularly the ways in which it catalyzes politics and practices that could disrupt (or further solidify) carbon lock-in and create low-carbon pathways.

Thus, while we agree with the broader goal of making NSS climate governance more accountable, we urge orchestrators to adopt an expansive approach to measuring value that encompasses relevant forms of scaling and entrenchment. In practice, this will necessitate reporting outcomes qualitatively in addition to quantitatively, and monitoring and evaluating ripple effects and positive and negative feedback over time. Further research will be needed on the design of such an approach—particularly, how best to account for interactions between NSS interventions and the multilateral system, and how to delimit the extent of indirect effects. As a start, we suggest that orchestration platforms should request routine progress reports from NSS interventions that specifically include evidence of scaling and entrenchment alongside outputs and outcomes. Only

through understanding how interventions become more durable and far-reaching can we obtain a true account of the cumulative impact, and therefore the value, of NSS climate governance, and thus allocate resources to the most impactful interventions.

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