The Micro Foundations of Global Climate Governance: An Analysis of the Transnational Emission Trading Network

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Introduction

Alongside the waxing and waning attempts to develop a comprehensive global climate change regime, diverse actors and processes have emerged at multiple levels that engage in climate change governance and policy-making. Rather than view such arrangements as constituting a “regime complex” (Keohane and Victor 2011) or fragmented governance (Biermann et al. 2009) – both of which suggest overlapping and sometimes competing sets of authority – we argue that many of these processes reflect multiple experimental attempts to govern climate change under a permissive global governance environment (Hoffmann 2011). While many of these experiments and processes appear to have arisen independently, we use network analysis of emission trading systems – perhaps the most important of these governance arrangements – to uncover ways in which the actors that drive and organize these schemes interact in an emergent governance system. Betsill and Hoffmann (2011) identified 33 distinct and diverse venues where emissions trading has been proposed, designed and/or operationalized between 1996 and 2008 (Table 1). While their analysis suggests widespread acceptance of emissions trading as an appropriate climate policy response, it also reveals considerable diversity in how emissions trading systems are organized and justified. We suggest that exploring the character of the transnational emissions trading network helps us understand better the patterns of climate change governance, specifically how this particular form has emerged and proliferated, and the variation in how emissions trading has been carried out in different jurisdictions.
Table 1. The Cap and Trade Policy Domain (1996-2008)\(^1\)

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From Betsill and Hoffmann (2011)

This paper is part of a larger project, a key motivation of which is to understand how the notion of carbon markets came to dominate thinking and practice about the global response to climate change. Conventionally, this question has been addressed in two ways. First, some have engaged in a general analysis in terms of prevailing environmental norms of “liberal environmentalism” or “market environmentalism” (Bernstein 2001; Clapp and Dauvergne 2005), ways that neoliberal capitalism constructs environmental problems ideologically (Heynen et al. 2007), or specifically in relation to climate change (Newell and Paterson 2010). In this view, emissions trading has “naturally” become the mechanism of choice, and the emergence of various such schemes can be regarded as the roll-out of a structural logic. While such explanations highlight the ways in which ideational and material structures provide favorable conditions for the rise of emissions trading, they do not explain observed patterns of variation in the timing and the ways in which emissions trading has been developed and implemented in different policy venues (Betsill and Hoffmann 2011).

Second, numerous studies have explored the particular dynamics of the policy venues that have adopted or considered emissions trading to explore the political features that have enabled or prevented such adoption, and shaped the particular sorts of systems that have been adopted. These studies most commonly focus on the European Union’s Emissions Trading Scheme (EU ETS), the largest such market yet adopted (Skjaerseth and Wettestad 2008; Ellerman et al. 2010), although some have analyzed other schemes (see variously, Rabe 2007; VanDeveer and Selin 2009; and for a comprehensive comparison, Betsill and Hoffmann 2011). While these studies provide insight into how specific features of policy venues (e.g. constellation of actors, power relations, policy history, etc.) shape the evolution of emissions trading, they do not address the ways in which these systems may be connected.

Part of the story about how these two levels of analysis are linked is structural and familiar. Within a permissive normative environment favoring the use of market mechanisms, emissions trading emerged as a key component of a global deal enshrined in the Kyoto Protocol (1997) and

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\(^1\) Since 2008, emissions trading discussions have developed in Brazil, China and India as well.
operationalized in the Marrakesh Accords (2001). Once institutionalized in the multilateral climate regime, the idea of emissions trading, either as a tool for achieving Kyoto targets (EU ETS) or for more localized goals (e.g. Regional Greenhouse Gas Initiative (RGGI), Western Climate Initiative (WCI)), spread from venue to venue and the tool was adjusted to fit local political and economic realities (Betsill and Hoffmann 2011). But this is not the whole story because an account of the link between the permissive normative environment and the proliferation and forms of particular emission trading systems is lacking.

To fill that gap, this paper focuses on the ‘inbetween’ or meso level between particular venue descriptions and a broad structural or normative logic. Our analysis is organized around the metaphor of a mushroom. What we know as the edible mushroom is the fruit of an underlying dense network of tangled threads called the mycelium. Mushrooms grow best under particular conditions but fruit will not appear in such conditions in the absence of a developed mycelium. In other words, the mycelium links favorable growing conditions to actual plant development. The permissive normative context discussed above represents the favorable growing conditions for emissions trading systems (the fruit). Our goal is to uncover the underlying mycelium—the network of individuals and organizations that have been instrumental in promoting and disseminating ideas about the appropriateness of emissions trading as a policy response to climate change as well as the specific details of how emissions trading can be carried out. The “emissions trading mycelium” germinated in the late 1980s/early 1990s as individuals and organizations discussed and promoted emissions trading in climate change debates across a broad range of places and bore its first fruit in the Kyoto Protocol/Marrakesh Accords. On the basis of these network links, emissions trading emerged in different spaces when conditions were ripe, without direct causal pressure or other sorts of connecting links on the “surface”, i.e., through intergovernmental agreement or hard law. To uncover this pattern of proliferation and adoption largely outside of the intergovernmental or transgovernmental (Slaughter 2004) process, we need to examine the way this network developed, proliferated and interacted with private, sub-national, national, and intergovernmental processes. We argue the interaction of a wider enabling normative environment and the network or communities of actors explains how emission trading has and continues to proliferate.

The paper proceeds in four parts. First, we summarize the main empirical argument and demonstrate the value of network analysis for revealing this mushrooming process of the proliferation of emission trading. Second, we go over the methods employed. Third, we undertake an initial and descriptive network mapping and discuss its findings. Fourth, we discuss limits to this kind of analysis, next steps in our research, and possible implications for the study of global environmental governance that increasingly involves novel forms that develop alongside official intergovernmental processes.

**Summary of Empirical Argument**

The story of emission trading is not linear or one of diffusion from one country to another, nor is it a case of intergovernmental agreement leading to adoption of a mechanism through compliance or promotion by an international organization. It thus differs from the story typically told either by the diffusion literature (e.g., Simmons, Dobbins and Garrett 2008) or macro sociological approaches based on either isomorphic tendencies in “world culture” (Meyer et al.
Instead, the idea of emissions trading for greenhouse gases was germinated amongst relatively small groups of economists, environmentalists, and policy-makers in the late 1980s and early 1990s and eventually grew to not only dominate the governance of climate change, but also to proliferate in diverse ways over time, space, and political jurisdiction. Ideas about the desirability of emissions trading for all manner of pollution had emerged in the academic literature much earlier, but first became articulated as a climate change policy response during this period. The core ideas through which the ‘common sense’ understandings of such market mechanisms as a means of responding to climate change – through notions of efficiency, flexibility, negotiability, the possibility of north-south bargains, in particular – were disseminated through this network. We suggest that an important contribution to understanding this process is to explore the character of the network of actors promoting emissions trading both transnationally and in specific venues.

Our claim is that there is a significant transnational dimension to the proliferation and diversification of emissions trading. Specifically we speculate that how emissions trading venues are networked to each other and to what has become a transnational pseudo-epistemic community significantly shapes the development of emissions trading in individual policy venues, the possibility of linking venues, and the evolution of the carbon market as a whole. We hypothesize that establishing the network patterns will explain, in part, the patterns of adoption and development of emissions trading over time, space, and political jurisdiction.

Empirically, we show a number of things about the transnational character and evolution of the emissions trading network. We show that the overall structure of the transnational emissions trading network is clustered and lumpy and has changed over time. During the germination phase, there are two separate origins for the network, one centered in the US, one in Europe organized around specific IGOs. These two originating network clusters are loosely connected to each other and differently connected to a cluster organized around the multilateral treaty regime, which institutionalized emissions trading in the Kyoto Protocol and Marrakesh Accords. While these clusters have retained largely distinct identities ever since, their connections lead us to characterize the emission trading network as a single network – or single mycelium to stick with our metaphor – but one that is lumpy and structured in different ways in particular venues and time periods. Second, we show that the links across these two broad networks are almost entirely made by actors from either the US or UK. Third, we show that the early clusters (roughly 1988-1995) are largely separate from the later clusters once emissions trading became operational, in the sense that there are very few individuals central to the network across the two periods. Returning to our mushroom metaphor, we see that the underlying structure of the emissions trading network is organized in a distinct way that has evolved over time. Our future research

In 1968, John Harkness Dales’s book *Pollution, Property and Prices* introduced the idea that transferable property rights could work to promote environmental protection at lower aggregate cost than conventional standards (Dales 1968). By the early 1970s, a number of government and academic studies that contained specific suggestions on how to cost the environment had appeared in the United States, the United Kingdom and Canada (Thompson 1972). The ideas promoted in those studies ranged from the development of economic incentives to the creation of private property in pollution rights, based on Dales’ ideas. As Hahn and Stavins (1992:464) note, “From these two seminal ideas – corrective taxes and transferable property rights – a substantial body of research has developed.” For a useful history of these academic debates, see Gorman and Soloman (2002).
will explore whether and how these features of the emissions trading network structure (mycelium) have shaped the characteristics of individual emissions trading systems (fruit).

**Methods**

The paper is largely based on a network mapping of the individuals and organizations involved in the various policy venues in which emissions trading has been discussed or implemented in relation to climate change. It is supplemented with extensive interview and archival data on the evolution of the climate regime and carbon markets from the early 1990s through to the present that we, as a team and in separate projects, have collected. We draw on this data to create a rich narrative of the early “germination” period in which networks of experts were engaged in proselytizing the idea of emissions trading as an appropriate response to the threat of global climate change. This material was also triangulated with the results of the network mapping and in some cases allowed us to identify errors in the network data.

**Social Network Analysis**

Social network analysis has a relatively long lineage in the sociology literature (e.g. Wellman 1983; Boissevain and Mitchell 1973; Coleman 1958; Scott 1991; Wasserman and Faust 1997). While the method draws upon graph theory and practitioners have developed a number of sophisticated quantitative analytics, the base concept of social network analysis is relatively simple. A network is made up of nodes and edges. The nodes are actors in the social system of interest (e.g. corporations, people, families, states, organizations). The edges are relations between the nodes (e.g. friendship, enmity, common corporate board membership, membership in intergovernmental organizations, trade, war, familial, and more). Organizing information about social systems in this manner is done to pursue knowledge on “regular network patterns beneath the often complex surface of social systems” (Wellman 1983: 157). Network analysts thus “try to describe these patterns and use their descriptions to learn how network structures constrain social behavior and social change” (Ibid: 157).

There are two main classes or categories of studies that we can undertake with social network analysis. First, we can undertake descriptive mapping, which entails observing how the structure of the network emerges from the relations of the components of the system. Second, social network analysts utilize quantitative tools to examine how network structure influences identities, roles, and behaviors. The goal is to examine how “the pattern of ties in a network provides significant opportunities and constraints” (Wellman 1983: 157). Sociologists (Wellman 1983; Scott 1991, Wasserman and Faust 1997) have developed a number of measures for such examinations at both the agent level and network level that may be of use for addressing concerns in international relations. In particular, different measures of the centrality of particular nodes provide information on how closely tied a node is to the rest of the nodes in the system or the ability of a node “to play the part of ‘broker’ or ‘gatekeeper’ with a potential for control over others” (Scott 1991: 89-90).

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3 The analysis is based on an original set of data collected by the authors and research assistants as part of a 3-year project on Governance and Legitimacy in Carbon Markets funded by the Social Sciences and Humanities Research Council of Canada (SSHRC).

4 This section draws on Hoffmann, Denemark, and Isherwood 2007.
For this paper, we mainly rely on descriptive mapping to identify the emissions trading network structure and patterns over the past 25 years. We are interested in the relationships between individuals and organizations that participate in the discussions, design, and operationalization of emissions trading in different policy venues so that we can understand how the general ideal of emissions trading, along with specific ideas about how to carry it out, have spread over time and space. We also employ a centrality measure called ‘betweenness’ to identify a set of particular actors that have been important links between clusters within the emissions trading network. This descriptive analysis can tell us a great deal about how emissions trading networks have emerged and changed over time and provides a foundation for further quantitative networks analysis. The next phase of our research will involve both network and nodal level analysis of the structure of the network as well as combining network variables with other data on the emissions trading venues to examine how network features explain variation in how emissions trading is carried out in different venues.

For this paper we draw on individual and organizational data for eight policy venues. The definition of a venue varies somewhat over the time period covered in the database. As noted above, we observe a “germination” period in the early days of climate governance where the idea of emissions trading emerged. For this period, we identify three venues: Project 88 in the US, OECD/UNCTAD\(^5\) and the Annex I Working Group (AIXG) that was the principal forum for discussing emissions trading in the UNFCCC negotiations before Kyoto in 1997. The other venues are more straightforward—specific instances where emissions trading is considered and designed as listed in Table 1 above. These include Kyoto/Marrakesh and four venues that have (or will) become operational—the UK, EU, RGGI, and WCI.\(^6\) Data collection consisted of examining reports of meetings and negotiations for emissions trading venues in order to ascertain who has participated in their design and operationalization. We recorded both individual names and organizational affiliations (NGO, corporate, IGO, various levels of government), noting the date(s) and extent of participation (how an individual participated—observer, stakeholder comment, negotiator, etc.) in emissions trading venues. Our database currently contains 1,889 individuals and 677 unique organizations.\(^7\) For the network analysis, only the 115 individuals who participated in more than one venue were included.

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\(^5\) The first IPCC Assessment Report, produced in 1990, also contained a chapter that discussed emissions trading. We discuss this in the passage below detailing the early discourse, connecting it principally to the discourse in the UNCTAD and OECD reports. It may be that the authors of this chapter also form part of this early network, and including them may complicate our network picture. But we have not been able to trace their names (only two names appear on the chapter, although it is clear there was a broader writing team) as the IPCC did not publish a list of all authors for the first assessment report and have no list on file. So these are left out of the network analysis for the moment.

\(^6\) The UK ran a pilot emissions trading system between 2003-5, as preparation for the EU ETS. For the WCI, the precise start date for the ETS is not yet completely decided, but at the time of writing, it looks like a number of members, notably California, British Columbia, Québec, and perhaps Ontario, are reasonably likely to start trading in 2013.

\(^7\) We are aware of a number of issues to do with the construction of this database. First, the availability of data for each venue varies considerably, both quantitatively and qualitatively. For some, complete lists of participants in consultative meetings, members of relevant committees, and so on, are available; for other venues access to such data is considerably more difficult. We have worked to make the data as comparable and comprehensive as possible, and, based on triangulating the results with our direct observations of these processes and extensive interviews, we do not believe that the results are invalid as a consequence of these limits.
The networks presented and interpreted below resulted from a series of methodological choices that need some mention. First, we defined the network by treating individuals or organizations as nodes and common participation in a venue as the link between nodes. In other words if John Smith and Mary Jones participated jointly in RGGI discussions they would be linked by a tie. The edges can be presented as value-free (i.e. no difference between a link that represents common participation in a single venue and a link representing 10 venues participated in common) or valued (the links representing different levels of common participation would be different). We present graphs of both kinds in the discussion below. In addition, the links can be censored or truncated by degree (i.e. only display links representing a specified number of venues in common). Finally, the nodes themselves can be represented scale free, or the size of the nodes can represent nodal characteristics, like centrality. In a number of the graphs below, node size is a function of the betweenness score of the node—a measure of centrality that captures how important a node is to the paths connecting nodes.

**Two Relatively Distinct Clusters**

Thus far, our major finding about the transnational emissions trading network is that there have been two distinct clusters in the network, with relatively loose links between them. In the early, “germination” period (late 1980s-early 1990s), this entailed one cluster organized in the US around the Project 88 initiative and one based in Europe, organized in particular by UNCTAD and the OECD (Figure 1). In Figure 1 the blue nodes represent these early venues, the red dots are individuals who participated in these discussions. This illustrates the separation between the two sites in which emissions trading discourse emerged in climate change debates. Only two individuals (Tietenberg and Dudek) participated in both Project 88 and in the OECD/UNCTAD reports. While both venues are shaped by a general normative context of liberal environmentalism, we demonstrate that the specific discourses used to make the case for emissions trading differ with the American cluster emphasizing economic efficiencies and the European cluster drawing on broader notions of justice and pragmatic political considerations at the international level. Given that these two network clusters are the principal sites for early discussions of emissions trading for climate change, we unpack the character of the discourse at each site and how it emerged since we anticipate that this will be important in our later work linking network characteristics to particular outcomes in developing emissions trading systems.

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Focusing on individuals or organizations as nodes downplays other ways that information can flow—e.g. through citations. In addition, while we concentrate on individuals or organizations that participated in the venues, this does not mean that other kinds of links between individuals are not also important.
The US Cluster: Project 88 and beyond

The network cluster that emerged in the US became organized in particular around “Project 88.” This was a network of economists (Tom Tietenberg, Robert Hahn, Robert Stavins, in particular) and policy-makers (specifically Senators Timothy Wirth (D) and John Heinz (R) who initiated the project) advancing arguments for market-based mechanisms in environmental policy (Stavins was the project director). Tietenberg in particular had championed the idea in his writing at least since 1985, when he published “Emission Trading: An Exercise in Reforming Pollution Policy.” While the use of emissions trading in various forms had already been implemented in a number of contexts in the United States, the most prominent application grew directly out of Project 88’s work, a system created by the revisions to the Clean Air Act of 1990 to address sulphur dioxide emissions.

Project 88 was also the first to suggest the possible use of emissions trading in dealing with climate change, in December 1988. Amongst other policies, its first report recommended an offset system in the US whereby those creating new sources of GHGs would be required to invest in measures that would neutralize the effect of their emissions (Project 88, 1988: 17-18), and the creation of an international emissions permit market in the design of a multilateral treaty.
on climate change (Project 88, 1988: 19-20).\footnote{12} In a second report, Project 88- Round II (1991), international emission trading to combat climate change plays an even more central role (pp. 18-22). By this time, as we will see below, the network favoring emissions trading had grown significantly.

The political support of the early network is an important part of the story. The two senators saw an opportunity to bring greater legitimacy to ideas already promoted by environmental NGOS such as Environmental Defense Fund (EDF) – Executive Director Frederic Krupp was an especially vocal advocate – but which had met with limited success. As Wirth put it:

Senator Heinz and I thought that economics was pervading everything else during the Reagan era and a lot of other issues were being looked at through an economic lens and why should environmental issues be excluded from that... environmental issues could not exist in a vacuum.\footnote{13}

Wirth approached Stavins shortly thereafter. Stavins is even more blunt about the legitimation process that was central to getting these new ideas accepted:

I think it’s easy to forget that because the political landscape has changed so tremendously in regard to (market) instruments in the intervening years... We had to be careful about how we approached this. After all, economists had been pushing these ideas for 30 years and the political process had been ignoring them. So it wasn’t enough to just present the ideas. It’s not the ideas that mattered. What really mattered was the framing, the packaging.\footnote{14}

Stavins noted that even in the United States, where the compatibility of the market and environmental protection had been pushed throughout the 1980s, the ideas still had to be framed in a way to gain consensus from the environmental and the non-Republican constituencies. Wirth’s co-sponsorship of Project 88, as a Democratic Senator, made a difference.

The early influence of the individuals and organizations involved in Project 88 on US national and foreign environmental policy, including climate policy, should not be underestimated. First, it is notable that the network cluster very explicitly formed out of a political, and importantly, bipartisan initiative. It also included participants from government, industry and civil society. Apart from Stavins, an economist at Harvard’s Kennedy School, key people behind the formulation of ideas in the report included Krupp and Robert Hahn. At the time a senior staff economist for the Council of Economic Advisers in the Executive Office of the President, Hahn by 1991 had moved to be a resident scholar at the American Enterprise Institute, a think tank generally associated with pro-market ideas and deregulation.

\footnote{12} Interestingly, in the context of current experimentation around carbon markets in sub-national and regional contexts, the authors also suggest a national offset program to develop “practical experience” in implementation that would give countries confidence before endorsing an international GHG trading initiative.

\footnote{13} Interviewed by Bernstein, 13 March 1997 (telephone to Washington, D.C.)

\footnote{14} Interviewed by Bernstein, 2 August 1996. (Center for Science and International Affairs, Harvard University, Cambridge, MA.); see also Passell 1988.
Also, according to Stavins, Krupp, Daniel Dudek (senior economist at EDF) and Joseph Goffman (who at the time was one of the key drafting lawyers on the Clean Air Act Amendments of 1990, but later joined EDF), had significant influence in the Bush administration on the Clean Air Act. EDF was an early leader among NGOs on emission trading on climate change. Goffman especially played a major behind-the-scenes role in promoting emission trading on climate change in a number of contexts and was part of the US negotiating team for the Kyoto Protocol. By 1990, Bush himself had expressed support at a meeting of the IPCC for the use of market mechanisms, presumably including tradeable permits, to combat climate change. “Wherever possible, we believe that market mechanisms should be applied and that our policies must be consistent with economic growth and free-market principles in all countries.”

Project 88 was also linked to some of the trading discussions developing in other policy venues during this period. Stavins, for example, notes being at a number of meetings in the early 1990s where his views on emission trading were solicited, including briefing the Canadian federal cabinet, at the OECD and in briefing’s in the lead-up to the 1990 Houston G-7 conference. Stavins also connected with the networks in OECD. As he put it, “When they started I gave them tons of stuff that I had written. Everything, I just turned over all my files, I don't remember the people's names of the people -- but the economists at OECD in Paris. I indicated the feeling that it was ridiculous to reinvent the wheel and I brought together a tremendous amount of literature for this purpose, tried to put it into lay terms. And the Project 88 report whatever it was, maybe 150 pages, well we probably had you know 7000 pages of draft material (laughs) so I turned over tons of stuff to them.” Stavins also “helped” Andrew Steer (who directed the report) on relevant sections of the 1992 World Development Report, so interacted with the World Bank folks working on this issue.

An Emerging European Cluster: The OECD and UNCTAD

While this fairly tightly knit cluster in the US was the first to mention the possible use of emissions trading in relation to climate change, the idea started to gain broader international currency during 1989 as a number of others, mostly from other English-speaking industrialized countries, took the idea and ran with it. As shown in Figure 1, they were at best only loosely connected to Project 88 participants. Between 1989 and 1992, a distinct European network cluster can be identified as having emerged.

Three papers produced during 1989 appear to be key here. In February 1989, Swisher and Masters (1989) proposed an international offset system. In the same month, Michael Grubb of the Royal Institute of International Affairs in London, proposed an international cap and trade system to the UK House of Commons Energy Committee (Grubb 1989a). He then produced a

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17 Interviewed by Bernstein, 2 August 1996. (Center for Science and International Affairs, Harvard University, Cambridge, MA.)
18 Interviewed by Bernstein, 2 August 1996. (Center for Science and International Affairs, Harvard University, Cambridge, MA.).
report which gained wide circulation, entitled *The Greenhouse Effect: Negotiating Targets*, published in December 1989 (Grubb 1989b). It was similar to the Project 88 proposal for international emissions trading, outlining in considerable detail why, in Grubb’s view, it would be preferable to pursue an international agreement based on emissions trading than on other designs being put forward (notably, fixed targets for states, and an internationally harmonized carbon tax). However Project 88 documents do not figure in the citations and the acknowledgements are mostly to UK-based policy makers (including David Fisk, chief scientist at the DoE and later chief negotiator for the UK), economists (notably David Pearce) and scientists (Tom Wigley, Richard Warwick). Grubb does acknowledge the ‘Harvard Negotiation Roundtable’, which may have included Stavins who was then at Harvard, but this is not clear.\footnote{In an interview much later (2007), Grubb mentions Richard Stewart as the person working on it in the US. Stewart was involved in project 88.}

Grubb does cite the Swisher and Masters paper as well as a paper by Geoff Bertram and colleagues, a New Zealand economist who had been asked to write a background paper on market mechanisms for the preparation of the first IPCC assessment (Bertram et al. 1989). The chapter of the Working Group I report for the IPCC First Assessment Report, perhaps tellingly entitled “economic (market) measures,” was also coordinated by an Australian (J Tilley) and a New Zealander (J Gilbert).\footnote{These people are not possible to find via Google, and for the IPCC FAR, full contributors’ details are not included in the report. We have approached the IPCC secretariat to get lists of contributors.} While the report is broadly favorable to emissions trading, it is far less explicitly in favor than Project 88 participants or Grubb, stating for example that:

> While there are potential benefits of national or international tradable emission permit systems, particularly their economic efficiency and cost effectiveness, many contributors had difficulty with the creation of "rights to pollute" and the administrative and monitoring requirements. A number of issues need further examination, such as: the political problem created by a "right to pollute"; the criteria used to determine the initial allocation of emission entitlements; the special situation of developing countries; the potential scope and size of a trading market; and the feasibility of the administrative structure that would be required to implement such a programme. (Tilley and Gilbert 1990: 234)

This analysis of the texts at the time supports our finding in the network analysis that the emerging European network cluster at this point was thus relatively detached from the existing US network cluster. Importantly, the discourse adopted by each was significantly different. Grubb is clear that for him and the people he worked with, the classical efficiency and pro-markets argument that dominated debates in the US, was less important than the more practical question of how best to get an international agreement given the various huge structural problems to overcome (the inertia of energy systems, global inequalities, uncertainties about emissions trends in particular countries).\footnote{Interviewed by Paterson, 17 December 2007. (Cambridge UK).} The closest connection is through the IPCC, where the link appears to have been more directly political rather than via existing policy networks.

This European network develops over the next 2 years, in part through the IPCC report which covered this, but in part because of the policy entrepreneur work of Frank Joshua at UNCTAD. Grubb had already been invited to speak at UNCTAD in 1990 following interest in the
Negotiating Targets paper as it was reviewed in the *Financial Times*. Joshua brought together the group of people who had started publishing on emissions trading in relation to climate change (notably Grubb, but also Scott Barrett, Kjell Roland as well as Tietenberg, and Richard Sandor from the Chicago Board of Trade) as well as interest by the OECD, who organized a workshop on “Tradeable Permits to Reduce greenhouse gas emissions” in June 1991. For UNCTAD and the OECD, the 1992 UNCED conference was a clear impetus; their publications were timed to come out shortly before that conference and contribute to its deliberations. For the OECD in particular, this work clearly also fit within its work since the 1970s outlining the case for the use of economic instruments in environmental policy, encapsulated by Bernstein (2001) as the shift to liberal environmentalism.

**Institutionalizing Emissions Trading: The Kyoto Protocol and Marrakesh Accords**

In the period following the adoption (1992) and entry into force (1994) of the UNFCCC, the European network cluster became organized more explicitly through the OECD. In the context of international negotiations in the UNFCCC process, ideas about emissions trading became discussed during the mid-1990s primarily through the Annex I Expert Working Group (AIXG) in the UNFCCC process, a working group coordinated by the OECD. This was formed during 1994-5, as Annex I countries wanted a forum in which to discuss informally the design issues regarding revisions or protocols to the UNFCCC that were being discussed.

The US EPA, specifically Dennis Tirpak, prompted the OECD to host these discussions by building on coordination of OECD member country activities regarding national communications to the UNFCCC that it had undertaken in 1993 and the workshop on emissions trading already organized in the run-up to UNCED. The OECD aimed explicitly to have a depoliticized debate around the various technical issues involved in the negotiations – measurement and monitoring of emissions, national communications, design of a protocol or other instrument. During the run-up to Kyoto, the AIXG became the key site where a technical consensus for emissions trading emerged. The Chair of the AIXG for most of the period was Doug Russell, lead negotiator for the Canadian government. Nevertheless, it appears that the most significant direct continuities to the earlier policy discussions are to the European network cluster rather than the American one. Figure 1 shows this clearly – with 4 links (Grubb, Kete, Corfee-Morlot, Jones) from the OECD/UNCTAD cluster and only Bohm from Project 88 – and Bohm was an economist from Stockholm University, not apparently a central actor in the Project 88 network. None of the key US economists promoting emissions trading in Project 88 or the US acid rain program appear in our database as having participated in the AIXG or Marrakesh.

This is not to say that the US-based network cluster became irrelevant in the process of institutionalizing emissions trading in the multilateral treaty regime. Rather, their influence flowed through the Clinton administration, which had very direct links to Project 88. Clinton’s appointment of Timothy Wirth as Under Secretary of State for Global Affairs is but the most

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22 Paterson interview with Grubb, 17 December 2007. (Cambridge UK)
23 The proceedings are published as Corfee-Morlot (1992). For other publications on this in this period see for example Hoel (1991), Markandya (1991), Dudek and Tietenberg (1992).
26 Russell later became a carbon trader, working for large trading firm Natsource.
obvious linking of the network to the administration, and can be read in part as an endorsement of the ideas of Project 88, which Wirth had championed in Congress. According to Wirth, many of the ideas in Project 88 also found their way into the U.S. Environmental Protection Agency, Department of Interior, and the State Department prior to Rio and informed the positions taken there.27

Indeed, the United States was largely behind the breakthrough idea to link binding targets to market mechanisms. This position started to unfold in 1996, as indicated by Wirth’s speech to the second Conference of the Parties in July 1996, where he made the link explicit:

> Based on these principles – encompassing environmental protection, realism and achievability, economic prosperity, flexibility, fairness and comprehensiveness – the United States recommends that future negotiations focus on an agreement that sets a realistic, verifiable and binding medium-term emissions target. We believe that the medium-term target must be met through maximum flexibility in the selection of implementation measures, including the use of measures such as reliable activities implemented jointly and trading mechanisms around the world (Wirth 1996).28

This proposal ultimately bore fruit because of the foundational work that had been conducted by the early network clusters, particularly the OECD/UNCTAD cluster whose members were directly participating in the AIXG. These individuals and organizations were already receptive to the idea of using emissions trading in the global response to climate change and were able to capitalize on the political opening provided by the US to move forward.

**Operationalizing Emissions Trading**

The 2001 Marrakesh Accords represent a crucial juncture in the development of carbon markets as a climate governance tool, precisely because it set out the mandate to develop a global emissions trading system to help the international community reach its Kyoto targets. Marrakesh thus appears as a key bridge between the early germination period and the operationalization of emissions trading in different policy venues. In terms of our mushroom metaphor, it is the moment at which the spores of the emissions trading discourse are settled in the ground, to bear fruit in various sites without necessarily strong actor-based connections between them. Of course, a global trading system did not come to fruition as originally envisioned, but the precedent set in 2001 opened political space for the development of emissions trading in other, smaller jurisdictions (Betsill and Hoffmann 2011). The Marrakesh catalyst motivated action in venues dedicated to Kyoto targets (EU ETS) and those designed independently of the Kyoto Process (RGGI, WCI).

Figure 2 shows that the relative separation between the US and European network clusters continues once emissions trading moves to the operational phase. The early networks already discussed appear in the bottom right of the picture (Project 88 and UNCTAD/OECD) and in the dense cluster in the middle (AIXG). The two clusters in the top of the picture are RGGI and WCI.

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27 Interviewed by Bernstein, 13 March 1997 (telephone to Washington, D.C.)
28 Interviewed by Bernstein, 13 March 1997 (telephone to Washington, D.C.)
The clusters at the bottom left are the EU ETS and UK. Among other things, this shows that only four people are significant in connecting the European and US clusters. Pershing and McLean are the only direct connections between US venues and the AIXG, while Gemmill and Duggan connect the EU and UK directly to the WCI. When we shift this to a degree 2 network (actors only appear if they participated in common with another actor in at least two venues) this separation becomes even more stark – the overall network collapses into 4 distinct clusters, as shown in Figure 3.

**Figure 2. Early and operational venues—degree 1 network**

Note: this is a degree 1 network and includes data from 7 venues (Project 88, OECD/UNCTAD, AIXG, UK, EU, RGGI, and WCI). The size of the blue box indicates an actors’ betweenness score. Larger node size means that node is more central to the network in the sense that removal of the node would have a relatively large effect on breaking up the network. A high betweenness scores is obtained when a relatively high number of the paths connecting nodes flow through a node.

In Figure 3, we have a cluster of those involved in both WCI and RGGI (centered on Pershing), a cluster of those involved in either the UK and WCI or EU and UK (centered on Gemmill), one of those involved either in AIXG and UNCTAD/UNCTAD or AIXG and UK (centered on Grubb), and Dudek and Tietenberg who are both involved in Project 88 and UNCTAD/UNCTAD. The transatlantic connections are thus very weak in terms of individuals directly working on multiple venues. To be clear, links could come in other forms (i.e. information can flow through other media than individuals), but this does demonstrate how relatively disconnected the operational discussions were from the early theoretical discussions and how the US and European venues developed in a relatively disconnected manner.
Another way of seeing this is that there are two distinct pathways from the AIXG\textsuperscript{\textcopyright 29} to the venues where emissions trading has (or will) become operational. Figure 2 can in effect be read temporally. Read this way, it shows that there are almost no direct connections from the very early debates (Project 88 and UNCTAD/OECD) to the operational venues. Only Grubb connects those debates to the UK, while Burtraw and Yang connect them to the US venues. All other connections go through the AIXG, and by extension Marrakesh. And this reinforces the American/European separation – since there are separate connections from AIXG to each. AIXG connects to the US venues via McLean and Pershing, while it connects to the UK via Grubb and the EU via Schaffhausen.

Figure 3. Early and operational venues—degree 2 network

We can note also another temporal dimension, in that the key connectors early in the process (from ‘germination’ to the Kyoto-Marrakesh process) are different to those that are present later. There is no one who is present all the way through, from germination, through Marrakesh, to one of the US venues. There are some individuals connecting through Marrakesh to the EU (Jones) and the UK (Grubb, Clark), and some that are present both in the germination and in WCI/RGGI (Yang and Burtraw) but none of the direct US connections to the early period pass directly through Marrakesh. As mentioned before, the key links across the transatlantic divide are also different in the two periods.

Transnational not Transgovernmental Links
When we turn to a perspective based on organizations (governmental, non-governmental, corporate, academic) as nodes in the emissions trading network rather than individuals another set of somewhat surprising characteristics emerge. Most notably, the key actors that work across venues are transnational (in the sense of being private sector or NGOs) rather than

\textsuperscript{\textcopyright 29}The picture looks largely similar if we add in the Marrakesh network. It is very close to the AIXG network and we leave it out for clarity.
transgovernmental as we might expect as per Slaughter (2004). This was certainly the case in the early germination period through Marrakesh (Figure 4). Of the 18 organizations in this degree two network (organizations that participated in two or more of the three early venues and Marrakesh), only two are national government agencies (US EPA and Environment Canada). NGOs, IGOs, and universities are all much more prominently represented in the network.

**Figure 4: Early venues and Marrakesh—degree 2 network**

As we move forward from Marrakesh to the operational venues, a similar pattern, but with different significant organizations, emerges. Figure 5 displays the degree 2 network for Marrakesh and the four operational venues in our database. Here we can see a significant increase in the number of actors that are participating in multiple venues (at least two in common to have a link) and non-state actors are again dominant. It is a bit difficult to see because of the density of the network, but the most central actors (measured by betweenness scores) are: BP, the Center for Clean Air Policy, CO2e.com, The European Commission, WRI, ICF Consulting, the Climate Trust, and the Pew Center. Moving to a degree three network in Figure 6 (where a link means that nodes participated in common in three or more venues), the dominance of non-state actors is abundantly clear. These eight organizational actors are the only ones that participated this heavily in the emissions trading venues.

Nation-state actors and transgovernmental agency relationships appear to play a relatively constrained role. One possible interpretation of this is that states and their agencies play a relatively small role in the dissemination of knowledge of emissions trading across venues, preferring to only really participate when their own state is involved directly (i.e. EU). Of course, industry actors show up at all the venues because they stand to be directly implicated in emissions trading rules. The network mapping seems to indicate that a core set of actors took up

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30 Note that this is a dichotomized network—an organization can either participate or not. We do not take into account the number of individuals from an organization that took part in venue activities.
the task of ‘proselytizing’ emissions trading (WRI, Pew, Center for Clean Air Policy, The Climate Trust) after Marrakesh across policy venues. They worked to operationalize the ideas that emerged in the germination period and achieved consensus amongst a small number of well-networked individuals. These eight organizations appear to be a core set of actors that are participating in all the operational venues and that are then linked to secondary and tertiary actors who participate in one or two venues. It is reasonable to suppose that they could be key gatekeepers or agents of information diffusion.

Figure 5: Marrakesh and operational venues—degree 2 network

Figure 6: Marrakesh and operational venues—degree 3 network
**The Anglo/American Dominance of Inter-Cluster Links**

A final observation to be made about the character of the transnational emissions trading network is that the links between the US and European clusters are either from the UK or US. This observation holds whether we explore the linkages via individuals in the network or organizational affiliations, as shown by Figure 6 (above) and Figure 7. They show how a relatively small number of key individuals connect these clusters. Figure 1 shows that there are 4 key connectors between the ‘germination’ period and the Kyoto/Marrakesh processes (Grubb, Kete, Bohm, Corfee-Morlot). Figure 7 shows that there is a group that connects those multilateral processes to the WCI and RGGI (Pershing, Wittenburg, Lesiuk have the highest betweenness scores of this group), and a group that connects either the EU or the UK to WCI (Duggan, Gemmill). With the exception of Bohm, all of these actors are from the UK or US. Figure 5 above shows that this also holds if we look at these connections from the point of view of organizations rather than individuals. It shows that the only organizations linking the European and one of the US venues (WCI – none link to RGGI) are British Petroleum, the Center for Clean Air Policy, and CO2e.com – a UK-based oil company, a US-based research-oriented NGO, and a US-based financial institution with its main carbon trading arm in London.

This is not an enormous surprise given knowledge about general patterns in comparative political economy and transnational politics. These include: the general Anglo-American dominance of

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31 The other exceptions from figure 4 are Reinaud (French, based at the IEA) and Lesiuk (Canadian).
32 CO2e.com is a subsidiary of Cantor Fitzgerald.
the global political economy (van der Pijl 1998), the broad split between neoliberal ideology in the Anglo-American world and a more social democratic and/or corporatist ideology in continental Europe (van der Pijl 1998; Hall & Soskice 2001), and the UK acting as a general bridge between European and American preferences given its ideological closeness with the US and its institutional closeness to the EU. Nevertheless it is interesting to see this pattern hold so closely. It suggests that the key actors keeping the networks connected arise out of the strongest sites of liberal environmentalist discourse, themselves the most broadly neoliberal states. This broad ideological context has provided a permissive arena for a set of policy entrepreneurs and researchers, combined with market-oriented government officials and corporate representatives to develop ideas and practices about emissions trading. These have then been diffused into the EU via UK-based actors and via the Marrakech network, and into the US almost exclusively by US-based actors.

Conclusion

We have tried to show in this paper a number of features of the transnational network of actors promoting emissions trading in relation to climate change. First, the transnational emissions trading network is lumpy and has changed over time. A key feature is the evolution of two distinct network clusters with relatively weak links between them. Overall, the direct actor-based connections between these networks are fairly thin. They are very strong between the AIXG and Marrakesh, perhaps not surprising since these are two facets of the Kyoto Protocol process. They are also fairly strong between the two operational (or nearly operational) US venues, RGGI and the WCI. But beyond that, only a small number of individuals or organizations connect these clusters. To us, this suggests that the idea of emissions trading circulated less through the direct interpersonal connections in the network and more through the diffuse promotion via literature and through reference to the broader ideological framework (neoliberalism/liberal environmentalism) that favored market mechanisms. Nevertheless, these network links served as a means by which such ideological preferences circulated.

Second, the Anglo-American character of the principal links between the various venues is worthy of attention. On the one hand, this could be seen to reflect a broad transnational Anglo-American dominance within the global economy (van der Pijl 1998), and the deployment of ideological ideas to further either the interests of a transnational capitalist class centered on the US-UK economic elites (ibid) or on the pursuit of US foreign policy with the UK as a strategically useful intermediary (Vucetic 2011; Williams 2004), depending on one’s theoretical preferences. On the one hand, it appears that the US used the AIXG to generate an expert consensus on the ‘flexibility mechanisms’, including emissions trading, in the face of diplomatic conflict over the issue in the UNFCCC process, reflecting claims about the pursuit of US hegemony. On the other hand, UK actors appear from our analysis to have played a role in some of the US emissions trading schemes (notably WCI), in effect transmitting knowledge from the EU ETS into the design of emissions trading in the US, a process more reflective of the US-UK as the key relation in the generation of transnational consensus.

Third, the diffusion process appears to be driven by transnational actors rather than transgovernmental ones. Governments and government agencies (both national and subnational)
work on directly on emissions trading in their own venues, but are not participating in the design
discussions for significant number of other venues (at most one other venue). Instead, corporate
and NGO actors appear to be the glue holding the global enterprise of emissions trading together.
When viewed in terms of either individuals or organizations that participate across venues, it is
the non-state actors that are the common denominators.

The present analysis raises a number of questions about the way in which the transnational
network operates in relation to the politics in different policy venues. What happens when this
transnationally-developed consensus meets divergent political conditions, in the form of counter-
discourses opposing emissions trading for a variety of reasons – from anti-market ideologies to
opposition to action on climate change per se? Further parts of our project will explore such
questions in greater detail to enable further evaluation of the role of the transnational network in
emissions trading politics. Specifically, we can examine how the different ways that venues are
linked to the network (i.e. to which other venues and through which individuals and
organizations) shapes how emissions trading is operationalized. In other words now that we are
beginning to achieve a sense of the network (or mycelium) connecting emission trading venues,
we can see how the connections interact with localized political and economic conditions to
produce the emissions trading systems (or fruit) that we observe.

Of course this analysis is preliminary and our conclusions are tepid at best. Two particular
caveats are perhaps the most important. First, ideas about how to enact emissions trading—how
to translate the broader ideological context of liberal environmentalism into specific emission
trading operations—can diffuse through different media than the ones we have captured in our
network analysis (individuals and organizations that participate in meetings). Second our
conclusions are very sensitive to the extant data. This is true of all data analysis, but is an
especially acute issue for this network analysis. We simply do not know if we have captured all
the participants in the venues we have discussed above. Further, the data we do have on
participants is scale free—in other words we do not know anything about the importance of an
individual’s or organization’s participation in a venue. If they are recorded as present in the
sources we have consulted, they are in the database.

However, these caveats notwithstanding, the network analysis both confirmed a number of
dynamics evident in our qualitative analysis (the emergence of a small group of experts in the
early days and divergence between the US and European networks) and suggested novel
temporal and political dynamics that we had not considered before (the different tracks for the
diffusion of emissions trading ideas and the importance of transnational as opposed to
transgovernmental linkages between venues). The analysis confirms our suspicion that the
meso-level between the ideological context and the politics of individual venues is a key area for
enquiry should we hope to fully understand the ongoing development of carbon markets.

These preliminary findings also suggest that diffusion mechanisms such as emulation and
learning, at least in this case, can easily miss the connections at the meso-level of policy ideas
and venues, which might be more telling in terms of how policy actually travels transnationally.
While further theoretical work is needed to assess similarities and differences in the mechanisms
of transmission explored here and in the diffusion literature – our initial findings suggest that
what on the surface might look like diffusion (from the US to OECD to Kyoto/Marrakesh to the
EU, for example) misses completely the mycelium or connecting tissue of policy ideas that already provided the basis for emission trading in different settings and locales. Network analysis is a useful means of revealing such connections, especially, perhaps, when policies operate at levels other than the nation-state.
References


