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Constructive and destructive dynamics of social transformation

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4 Performances of an international professional community

CCS/CCUS and its national contexts

Danielle Endres, Brian Cozen, Megan O'Byrne and Andrea M. Feldpausch-Parker

Introduction

The climate crisis is the most pressing sustainability challenge we face today (Intergovernmental Panel on Climate Change 2007, 2015). Despite the scientific consensus that confirms the materiality of anthropogenic climate change, it "presents perhaps the most profound and complex challenge to have confronted human social, political, and economic systems" (Dryzek *et al.* 2011: 17). The complexity largely stems from the international and intergenerational nature of climate change as well as the uneven distribution of both the sources of greenhouse gas emissions and the negative impacts across nations. Given the role of fossil fuels and their greenhouse gas emissions in worsening climate change, rethinking energy policy is a crucial aspect of any response to the climate crisis. This response must be international, because the catastrophic implications of climate change will not respect national political boundaries. An international response, therefore, requires the construction and maintenance of an international community that can not only monitor and regulate greenhouse gas emissions but can also address the unique circumstances of particular national communities and their varying roles in contributing to the climate crisis.

While community can be defined in a variety of conflicting ways (Shepherd and Rothenbuhler 2000), we define community simply as a group of people with shared interests. This definition is not limited to a geographical or political conception of community (e.g. the United States), but also allows for communities that cross a variety of geographical or political boundaries. The range of communities involves "relationships, families, neighborhoods, voluntary associations, municipalities, regions, or nation states" (Depew and Peters 2000: 3). Across this range, Benedict Anderson (2006) differentiates between actual and imagined communities. Actual communities are premised on everyday face-to-face interaction between members (and are therefore practically limited in size). Imagined communities are social constructions that are imagined by the people who identify as members, such as a nation, within which it would be impossible to have face-to-face interaction with everyone

in the community. While there is overlap between the actual and imagined communities, these concepts are useful towards thinking through the role of rhetoric and communication in community construction. Anderson (2006: 9) argues that a nation, and we would add an international body, is "an imagined political community". In this case, both an international community to address climate change and a national community fall within Anderson's notion of an imagined community.

Yet, as we know, while there is an international community of concern about climate change, creating lasting and binding agreements has been an ongoing challenge (Giddens 2009) including the long-standing reluctance of the largest emitters – namely, the United States and China – to sign international CO_2 reduction agreements, and the failure of the UN Framework Convention on Climate Change to achieve binding agreements (most recently held in Geneva, Switzerland in February 2015) (Klein 2014).[1] Unfortunately, effective international action on climate change is not easily achieved, as evidenced by the fact that it has been over 20 years since the first definitive findings of the greenhouse effect and climate change debuted. Therefore, a guiding assumption of this chapter is that the lack of an international community that can effectively address climate change is the most pressing sustainability issue faced by humanity today.

We do not intend to solve this problem of a lack of an effective international community to address climate change in this chapter (although we wish it could be that easy). Instead, the purpose of this chapter is to examine, from a rhetorical perspective, some of the constraints on building this sort of international community to address climate change through energy policy. In particular, we examine how national policies and contexts constrain an international community's ability to take action. As much as we talk about globalization and the collapsing of national boundaries, the reality is that national communities are still relevant towards creating the regulatory environments needed to address climate change as an international issue. This tension between national and international is not new. Indeed, the argument of this chapter may be intuitive and unsurprising. Yet, there is power in unpacking this tension in a particular case study and revealing the complex ways in which national communities constrain international action.

We narrow our focus to one representative anecdote (Burke 1969) of this tension between international community action and national community action. A representative anecdote is a single anecdote that represents a larger phenomenon. In this case, we use the international community of carbon capture and sequestration (CCS)[2] and carbon capture, utilization, and sequestration (CCUS)[3] professionals working on the research, development, and implementation of CCS/CCUS as a suite of low-carbon energy technologies. This collection of professionals functions as an example to highlight the larger phenomenon of the tension between international community and national community with regard to climate change.

The distinction between CCS and CCUS, mainly the insertion of *utili tion* in 2012, partially stemmed from political barriers to the passage of clim legislation (most notably in the United States) and industry desire to co modify anthropogenic CO_2 for processes such as enhanced oil recov (EOR) (Endres *et al.* 2013). Although research into CCS began in the l 1980s, it did not become an important facet of international deliberati about energy policy and the climate crisis until the early 2000s (Herz 2001), particularly after the Intergovernmental Panel on Climate Char (IPCC) recommended CCS as a primary strategy for climate change miti tion (Intergovernmental Panel on Climate Change 2005). CCS/CCUS overarching terms for a variety of technologies that reduce CO_2 emissi from coal-based energy production and other stationary industrial sources (e cement plants, ethanol plants, refineries, and iron and steel mills) (Interg ernmental Panel on Climate Change 2005; US Department of Energy 200 CCS is a suite of transitional energy technologies that seek to lower the C emissions from a fossil fuel energy source (or in the case of CCUS, ben secondarily from the CO_2 capture process for use in other industrial ope tions), and are therefore different from alternative energy technologies t reduce dependence on fossil fuels, such as wind and solar. CCS/CCUS te nologies, however, have enough similarities with other low-carbon ene technologies to merit serving as a case study for our larger question about t constraints on building an international community to address climate char through energy policy.

We turn our attention to the communicative rhetorical practices of t CCS/CCUS professional community as a way to understand how natio communities constrain international community action on energy and clim change. *We define communication, from a rhetorical perspective, as a form of symb action in which symbols (language, visuals, etc.) are mobilized to influence how make sense of the world.* Symbols act as terministic screens that reflect, fra and constitute an understanding of the world (Burke 1966). Kenneth Bu states, "even if any given terminology is a *reflection* of reality, by its v nature as a terminology it must be a *selection* of reality; and to this exten must also function as a *deflection* of reality" (1966: 45). In other words, rh oric is, consciously or not, constructed to make sense of the world throu emphasizing certain things and deemphasizing others, or emphasizing c way of viewing the world over others. One of the ways we make sense our world is through the creation of and identification with communiti Communication is crucial to the development of community because of representative and constitutive functions (Shepherd and Rothenbuhler 200 For the international CCS/CCUS professional community, evidence of th existence can be seen in the way people talk about them and in how t mobilization of symbols has consequences on the construction, maintenar and deconstruction of community.

The international community of CCS/CCUS professionals acts as a bric between two other relevant forms of imagined community: internatio

climate change community and national community. The CCS/CCUS professional community is both an actual and an imagined community, made up of people with a shared interest in developing and promoting CCS/CCUS technologies as a part of the solution to reducing greenhouse gas emissions and curbing climate change. This community is actual in the sense that it is premised on a variety of networks between its members, who often meet up in face-to-face or virtual meetings. It is imagined in the sense that it articulates a vision of an international solution to climate change through CCS/CCUS technologies that is not dependent on actual face-to-face contact. This community is made up of basic and applied scientists and engineers from academic, industry and governmental sectors; representatives of energy corporations; non-governmental organizations (NGOs) related to CCS/CCUS, energy policy, or climate change; and government agencies. The CCS/CCUS professional community is a transdisciplinary network across these sectors in pursuit of a shared solution to a real world problem that transcends one discipline or perspective (Sprain *et al.* 2010). The CCS/CCUS professional community is not a geographically or politically bounded community, but is made up of people from a variety of locations and political affiliations with a common interest in CCS/CCUS technologies. In this way, it is an international community in that its members extend across the globe, but it also has intersections with more geographically and politically bounded national communities through its members. As such, the CCS/CCUS community situates itself as part of a broader imagined community to address climate change. Yet, it is made up of people who are also members of imagined national political communities. This professional community, then, intersects with other international and national community responses to climate change and energy policy. That is, the actions of the CCS/CCUS professional community with regard to climate change and energy do not happen in a vacuum, but are always related back to the actions of other international communities (e.g. the UN) and national communities (e.g. the United States, China, etc.). As we will show, the laws and policies of national political communities form a constraint on the ability of the international CCS/CCUS community to address climate change, either through collaboration with another international body like the UN or on its own.

One of the major nodes of community development and maintenance for CCS/CCUS professionals is the conference, where community members meet face-to-face to discuss the technological and societal implications of CCS/CCUS technologies. As such, to access the rhetorical practices that relate to the role of CCS/CCUS professionals in the construction or deconstruction of an international CCS/CCUS community aimed at reducing CO_2 emissions, we conducted participant observation within the CCS/CCUS community. We have been involved with research on the social and cultural dimensions of CCS/CCUS covering eight years. Our backgrounds not only arguably make us peripheral members of the CCS/CCUS professional community but also allow us to participate in a variety of venues where

CCS/CCUS professionals gather, including the attendance of the annual spring CCS/CCUS conference in Pittsburgh, Pennsylvania. Although this conference is held annually in the United States, it is an international conference that draws speakers and participants from countries such as Canada, Norway, Japan, China, the United Kingdom, the United States, and others. In this chapter, we focus on the eleventh Annual CCUS Conference (2012)[5] to analyse the communication strategies used in relation to the topic of the role of CCS/CCUS in international efforts to address climate change. This conference is significant because it signified a transition of CCS/CCUS community thinking from mainly climate change mitigation to CO_2 commodification and climate change mitigation.

In the case of CCS/CCUS, efforts to build international community are fundamentally limited by the laws, regulations, and cultural practices of the national political communities in which CCS/CCUS technologies must be situated. The rhetorical practices of the CCS/CCUS professional community offer a window into how these constraints materialize in everyday conversations among these professionals. The CCS/CCUS professional community has to negotiate the boundaries within and outside their community to address the tension between national and international communities. This type of rhetorical boundary-work – breaking down, reinforcing and creating anew the boundaries that demarcate national and international community – highlights the significant role of communication in the (de)construction of community especially in this context, wherein international politics and policies complicate the communication at hand. Even though our case study primarily focuses on a failure in international community construction, there are practical lessons that can contribute to alternate strategies.

We begin by further clarifying a theoretical framework that draws from boundary-work. Then, we discuss our methodological approach, which uses rhetorical field methods to better understand the ongoing practices of boundary negotiation within the CCS/CCUS professional community. The subsequent section presents a discussion of our findings. Finally, we conclude with implications for future study and practical lessons.

Theoretical framework: negotiating boundaries within communities

In professional conversations that situate CCS/CCUS as a part of a suite of energy technologies that can address climate change, the professional CCS/CCUS community contends with negotiating boundaries between the national and international community, particularly as related to the tension between national laws and regulations that can constrain or enable an international community response to climate change. Examining CCS/CCUS technologies and how professionals talk about those technologies also contends with boundaries between science and society; in other words, boundaries are constructed between what the technology produced by the community can do and the enabling and constraining factors of implementing

these technologies in messy societies with conflicting laws, policies, attitudes, ideologies and politics. In this case, the boundaries between national and international community and science and society play an important role in energy and climate change. As stated above, we argue that national communities serve as constraints on the development of an effective international community, which is an important part of any solution to anthropogenic climate change. This is seen in the discourse of CCS/CCUS professionals seeking to envision how their technologies can be put into the service of new climate-conscious energy policies. Yet, these boundaries are neither essential nor fixed. Rather, they are socially constructed by communities and communication, and are "ambiguous, flexible, historically changing, contextually variable, internally inconsistent, and sometimes disrupted" (Gieryn 1983: 792), a point that we will return to in the conclusion.

In order to better understand the national and international boundaries at play in the CCS/CCUS professional community, we turn to academic studies of boundary-work and demarcation (e.g. Gieryn 1983, 1999; Kinsella *et al.* 2013; Taylor 1996) that examine the discursive construction of boundaries within technoscience, such as energy technology's role in addressing the climate crisis. Boundary-work comes out of both science, technology and society (STS) and rhetoric of science (RoS) traditions to focus on how science functions as a cultural, social and rhetorical practice that enables scientists and engineers to construct (evolving) boundaries. These boundaries can be used as a way to, for example, name and define their activities, garner credibility and speak to the social implications of their work. Although much boundary-work scholarship focuses on scientific laboratory practices, the concept is not limited to those practices (Taylor 1996). Boundary-work comes into play in a broad range of scientific and technical practices, including grant work, public outreach and professional scientific and technical conferences.

While an examination of CCS/CCUS professionals could be used to explore boundary-work across scientists and the public, as has been done in much boundary-work, our vantage point and purpose highlight the negotiation of boundaries between national communities within the international CCS/CCUS professional community. The majority of rhetorical work on demarcation and boundary-work has examined the boundaries between science and non-science (i.e. fraud or bad science) or between science and the public (e.g. Condit 1996; Derkatch 2012; Holmquest 1990; Keränen 2005; Kinsella 2001). Through our analysis of the interdisciplinary CCS/CCUS professional community, we highlight the boundary work that happens in professional conversations about the application of CCS/CCUS, and its relationship to national and international political communities. Gieryn suggests that "boundary-work is strategic practical action. As such, the borders and territories of science will be drawn to pursue immediate goals and interests of cultural cartographers, and to appeal to the goals and interests of audiences and stakeholders" (1999: 23). Cultural cartographers include individuals

within the community seeking to frame its goals and interests, whereas audiences and stakeholders are members of the community that have an interest in the outcome of the framing. Community members can shift between cartographers, audience members and stakeholders, depending on the situation. As we demonstrate in our analysis, however, it is more complicated than this. The drawing of boundaries within a professional scientific community is constrained by its interaction with other communities. In this case, while the CCS/CCUS community has the power to name and frame its own goals and interests through boundaries, it does not have the power to make its goals mesh with external community standards, laws, and policies.

Rhetorical field methods

Using rhetorical field methods (Middleton *et al.* 2011), we gained access to the everyday rhetorical practices of CCS/CCUS professionals in action. Rhetorical practices are "mundane, embodied, repetitive actions; they are the daily arguments and compromises that compellingly convince us of who we are and how we ought to act" (Senda-Cook 2012: 131). We focus our analysis on one moment in our ongoing research of the CCS/CCUS professional community: the 2012 Annual CCUS Conference. Our participant observation at this conference – data including field notes (e.g. Emerson *et al.* 2011), ethnographic interviews (e.g. Lindlof and Taylor 2010), transcribed plenary speeches, and conference materials (e.g. the conference program, fliers from exhibition tables, copies of presentation slides, etc.) – illuminates the negotiation of boundaries in action. In line with rhetorical field methods, we used rhetorical criticism as our mode of analysis of the data we collected through fieldwork. This allows us access to an untraditional rhetorical text for analysis, giving an important window into *in situ* rhetorical practices (as opposed to already documented texts, which are the mainstay of traditional rhetorical criticism).

The National Energy Technology Labs (NETL) and Exchange Monitor Publications – a private technical publishing house devoted to nuclear and CCS technologies – convened the eleventh Annual CCUS conference in 2012. This conference included a wide variety of participants, ranging from industry (e.g. Shell, Electronic Research Power Institute (EPRI), and Schlumberger Carbon Services) to basic and applied scientists and engineers from academic, governmental and non-governmental organizations. The conference boasted roughly 600 participants from 22 countries and a total of 300 technical posters and papers presented on CCS/CCUS research and development (R&D) efforts. This clustering of professionals presented a diverse audience of attendees representing competing and/or complementary interests in relation to the climate mitigation strategy of CCS/CCUS technological implementation. The conference theme was unique in relation to these participants. The theme for the conference was "Building a Business Case for Carbon Capture, Utilization, and Sequestration: Good for the

Economy and the Environment". Building a business case for CCUS refers to developing strategies to make the technologies economically viable for businesses to implement successfully (i.e. with a profit margin). This theme is important because it reflects how the community was focused not purely on the scientific and technical feasibility of CCS, but rather on a more normative goal of promoting the value of CCS as a response to climate change that can also be good for the economy. The theme spanned the boundary between science and society in its focus on a business case for CCUS that converged economic and environmental motivations. To the extent that this theme served as a starting point for conference discourse, the intersections between technical feasibility and societal achievability of CCS/CCUS were predominant themes throughout the conference.

Bruno Latour (1988) argues that technoscientific communities are best understood through their everyday, on the ground practices, and in this case professional conferences serve as an important node of the practices of the CCS/CCUS professional community (see also Latour and Woolgar 1986). Indeed, while the laboratory or field research sites are most commonly associated with the everyday practice of technoscientists, these communities also practice across a variety of different sites (Hine 2007; Lorenz-Meyer 2011). Professional conferences are a relatively understudied but crucial site of technoscientific communities in action (Heath 1998; Krauss 2011, 2009). CCS/CCUS conferences are a particularly important site of localized practices for the CCS/CCUS professional community because, besides journal articles, it is one of the major sites in which CCS/CCUS professionals engage in conversation about their research. Unlike journal articles that sustain a distanced and timeless conversation, CCS/CCUS professional conferences involve emplaced and time-bound interpersonal conversations about research and its societal implications. This allows for co-presence and chance encounters (Henke and Gieryn 2008) where cross-disciplinary CCS/CCUS professionals converge to present, discuss and develop new scientific ideas. For a topic as transdisciplinary and politically charged as CCS/CCUS, conferences serve as a crucial localized site of knowledge production and interaction. As we will show, much of the conversation in the plenary sessions particularly was focused on normative claims about CCS/CCUS and its role in society.[6] It was within this context that we observed the tension between national and international community.

Setting the scene – CCS/CCUS as energy solution

The conference actively engaged with the societal implications of CCS/CCUS technologies, thus breaking down a supposed boundary between science and society from the start. This was not a conference solely devoted to scientific and technical details about the feasibility of CCS/CCUS (although some sessions did address this component). Rather the theme and the spirit of the panels, particularly the plenary sessions, emphasized and debated the role that CCS/CCUS could play in relation to societal needs for environmental protection (climate

change) and promoting the economy. One of the most important themes that emerged was the idea that CCS/CCUS is good for the environment because it reduces CO_2 emissions and addresses climate change but it is not yet good for the economy – it is very expensive and not currently economically viable. The goal of making the "business case" for CCS/CCUS highlighted the economic viability and benefits of CCUS (taking the environmental benefits as a given).[7] The conference chair, in his introduction of the first speaker of the conference, set the conference theme by foregrounding the economic and policy work of CCUS. He noted that making a business case for CCUS and developing a clear image for its role in the future of energy and climate mitigation was "maybe some of the most important work going on in the energy sector". This highlights the important linkage between policy and R&D of new technologies, especially low-carbon energy-related technologies (Feldpausch-Parker *et al.* 2013). This situates CCS/CCUS within an international community of professionals committed to this technology as a part of the solution to climate change and the related necessity of re-envisioning energy policy. This sort of an international community contends with the particular legal and policy contexts of national communities, creating a tension in the boundary between national and international community.

Participants at the conference talked about CCS/CCUS as a mechanism to reduce greenhouse gas emissions and address the climate crisis. The CEO of an international centre to promote CCS (with substantial funding from the Australian government) stated: "Decreasing CO_2 emissions at the end of it all is really the key reason for pursuing CCS". This sentiment was echoed throughout the conference by presenters representing a variety of countries, international bodies and sectors (academic, governmental and industry). Yet, concomitant to the feasibility of CCS/CCUS to reduce greenhouse gas emissions was the recognized need for aligned national and international agreements on reducing greenhouse gas emissions that also put a price on CO_2 through a carbon tax or cap and trade. The same CEO noted that global agreements are one of the five central challenges that need to be met to move faster on CCS/CCUS. In the absence of stronger international greenhouse gas emission reduction targets and a carbon tax or cap and trade system, CCS/CCUS is expensive. The conference's focus on the "business case" for these technologies is an attempt to think about the viability of CO_2 mitigation in the absence of these sorts of international agreements. As an official in the US Department of Energy (DOE) noted in his headliner plenary address, "That was appropriate at a time when we were looking at things like carbon tax or cap and trade, but I'm here to tell you today it's about a business case". These examples reveal that the societal application of CCS/CCUS technology was a central component of this conference. The conference started with an assumption of the failure of international agreements and attempted to make an international business case for CCS/CCUS. Yet, as we will demonstrate, this goal was also constrained by national communities and their specific contexts and policies.

Findings and discussion – national community policy as constraint

We found that the discussion of the viability of CCS/CCUS as an international solution to climate change always tied back to the constraints within national political community laws, regulations and policies. This highlights a tension between the community's desire to promote CCS/CCUS as an international solution to an international problem and the reality that the success of such a solution depends on national conversations and policies that could undermine international goals. The boundaries and inconsistencies between national political community approaches to climate change and energy create a constraint on international action. In this section we highlight speakers from the United States, Canada, Norway, China and the European Union (EU), whose rhetoric reveals the boundary-work between national and international community. We selected these countries because they were more strongly represented at the plenary sessions and other conference activities than other countries. While many participants understood the need for an international agreement to reduce emissions and price CO_2, discussions of topics including implementation of CCS/CCUS technology, international technology transfer to promote CCS/CCUS, and the need for economic incentives for CCS/CCUS consistently came back to discussions about national contexts as limitations to developing CCS/CCUS as an international solution. These discussions involved participants both reflecting on their own national community as well as on other national communities. The US national context was predominantly featured in the conference due to its location, co-sponsorship by the Department of Energy, and the demographics of the majority of conference attendees. Yet, the US context did not dominate as there were explicit efforts to bring international NGOs, and representatives from other countries into the plenary sessions of the conference. We will begin with a discussion of the US national community context, and then address some of the other national communities represented.

In the US context, there was a strong argument for moving to a primary focus on CCUS with EOR as the business case, or the economically viable way to implement CCS technologies. The plenary headliner, a ranking official at the US DOE, explained the need for shifting from an emphasis on CCS alone to an emphasis on CCUS with EOR, noting the constraints of US policy. He argued that US policy has been slow to create a regulatory climate conducive to CCS such as a carbon tax, some other mechanism to make CO_2 a commodity, or stricter limitations on greenhouse gas emissions. Within this regulatory climate, the US community is more amenable to something like EOR that utilizes carbon as a commodity and puts it in the hands of industry, wherein industry needs a business case or an economically rational reason to deploy this technology. He noted, "in the absence of carbon policy" enhanced oil recovery is a win–win type of situation to get "oil out of the ground that otherwise wouldn't be available to you ... get a benefit for our security in this country and create jobs, generate tax dollars, etc., etc. and get the tangible benefit of sequestering CO_2". In this regulatory context, the US DOE has a strong interest in and incentive to deploy and commercialize technologies that work with the policies and regulations set forth by the US government and that make sense from a business perspective.

This brings the conversation to the high cost of CCS/CCUS. An explicit assessment of the costs with R&D and eventual commercial deployment of CCS/CCUS is required to determine its potential for deployment and commercialization (Feldpausch-Parker *et al.* 2013; Johnsson 2011). On the capture side, it costs money to build and maintain the additional infrastructure needed to retrofit current coal-fired power plants and to build new ones. CCS also costs energy because a coal-fired power plant fitted with capture technology needs to burn more coal to produce the same amount of electricity. From one vantage point, these costs can be evaluated in relation to the benefit of mitigation of anthropogenic greenhouse gas emissions and responding to the climate crisis. Yet, if anthropogenic climate change is not recognized as a significant problem, if there is no price on CO_2, and if there are not strict limits on emissions, the added costs of CCS do not justify its addition to an energy portfolio. However, CCUS with EOR, as presented in the conference, provides a business-friendly alternative that appears to be both economically viable and environmentally beneficial (Tomski *et al.* 2012). This example shows the tension in developing an international community to address climate change through energy policy when the regulations of a particular national community serve as limitations to the use of a particular technology.

Within this context, the conference theme of a business case for CCUS represents an attempt to overcome the economic limitation by making CCS more economically viable through adding EOR to the CCS process. This theme strongly represents the US and North American context. The regulatory context of the national US community constrains the industry's ability to move forward with a technology that could help provide a transition away from fossil fuels. Ironically, the solution is to combine these technologies with industry practices that would actually increase reliance on fossil fuels and tap into previously inaccessible oil reserves. US-centred governmental and industry presenters used the framing shift to sell CCUS as something that could revive CCS, perceived to be dying because of a lack of good legislation and regulation and a deficient business case without utilization (i.e. the U in CCUS). The case of the United States points to how the rhetorical appeal of the CCUS narrative is always dependent upon its political context. An implication of this is that it entrenches a perspective that given a failure in policy to address climate change mitigation, the immediate response is to shift to the market as a potential solution.

Yet, the conference's focus on the US regulatory context also created boundaries between the US community and other national communities, both highlighting the differences between national contexts and revealing the constraints to international community building around CCS/CCUS

technologies. What makes sense for the US national community does not necessarily make sense for other national communities with their own set of contexts and regulations, thus further breaking down the ability to create an international community response to climate change. Indeed, the CEO of an international institute to promote CCS noted that while CCUS–EOR works well given the context of the US community, it does not work well in other national community contexts. He noted,

> One of the challenges with EOR is that while it is a highly viable, incredibly affordable approach in North America, it is not the same experience in much of the rest of the world. The opportunity for EOR from all that we can understand is actually vastly more limited with few exceptions. So in many nations, CCS has to be on the back of climate change policy.

And even in those countries where EOR is possible, it may still be limited by differing governmental regulations. For example, an executive from a Canadian energy company focused his plenary presentation on the success of CCUS demonstration projects in Canada, noting that while the regulatory environment in Canada makes it difficult to build new CCUS-capable (with EOR) power plants, retrofitting has allowed Canadian projects to move forward.

We turn now to a discussion of Norway as an example of how national communities that promote international community are also limited. In other words, Norway's position, as represented by participants at the conference, was to do what it could to support international efforts to deploy CCS/CCUS in order to address climate change.[8] At a plenary presentation, the CEO of Statoil deemphasized the conference's primary focus on making a business case for capturing CO_2 for EOR and re-presented CCS as more importantly about climate mitigation, claiming that "climate change is the true elephant in the room", and should not be lost in discussions about the economic viability of CCS/CCUS. Statoil represents the Norwegian government in holding oil reserves in the North Sea in trust for Norwegian citizens, as described in more detail in Chapter 7's discussion of the PTD. This structure may have enabled the CEO to describe the costs of CCS as necessary toward achieving and outweighing the benefits of reducing greenhouse gas emissions to use "CCS for a better climate". As one researcher noted, this unabashed acknowledgement from an industry executive might signal a different perception of climate change by the Norwegian government and energy industry. This executive's plenary presentation reveals how, within a different national community context, it is appropriate and possible for a publically owned corporation to prioritize climate change over economics and regulations. All of this is not to say that economics and regulations are unimportant, rather Norwegian (and more broadly EU) regulations and their economic implications support the further development of CCS. Norway has a strong CO_2 tax, which provides a crucial tax incentive for sequestration. In other words, Norway's regulatory structure does what the international community cannot in terms of making CCS viable through climate regulation. It also has strong government investment in the commercialization of CCS through this corporation in particular. This national context may enable a broader approach to incentivizing CCS than the more short-term promotion of the business case that was emphasized throughout the international community gathered for this conference.

In addition to revealing a tension between differing national community responses to CCS/CCUS, the case of Norway also raises an additional constraint to CCS/CCUS's role in international action to prevent climate change. The Norwegian executive noted that CCS makes little sense unless it is deployed internationally. As such, it is in the interest of Norway to promote international community partnerships. Indeed, the corporation's website states:

> The programme focuses on new approaches and innovation, as well as on professional and international cooperation. The objective is to contribute to achieving lower costs for CCS, and to ensure that this essential technology is implemented internationally sooner that would otherwise have been possible.

Yet, those partnerships are limited by national and industry community interests in retaining control over CCS/CCUS R&D. The Norwegian CEO called for more partnerships across countries (as opposed to industries who are more interested in protecting intellectual property) "to share the knowledge" toward wide scale deployment. He noted that Norway has an open invitation for others to come and bring their technology for research collaboration and demonstration projects. Sharing intellectual property, especially across national borders, often comes with strings attached. National governments have, in many cases, been a driving economic force (whether through tax incentives or grants) behind the research that has thus far promoted CCS/CCUS R&D. Transferring intellectual property, gained literally at national expense, is tricky in most cases and specifically prevented in others. Further, when the focus is shifted to a business case that puts more responsibility on business to pursue CCUS, intellectual property sharing from industry is even less likely to occur. In the case of Norway though, where nearly all CCS research is state-funded, this presenter argued that the role of the state was to share knowledge and promote international cooperation rather than to protect intellectual property. Even in a case where a national community actively promotes international community cooperation, we see that this advocacy still comes back to national community both in that it is in the interest of Norway to promote CCS and that international cooperation is not in the interest of all national contexts. Norway's rhetorical efforts to mobilize an effective international community to address climate change through sharing knowledge and technology about CCS as a key part of the solution are still constrained by boundaries between different national community contexts.

China provides another perspective on the tension between national and international communities. China came up frequently in the discussions of CCS/CCUS, both in terms of a fear of China's future emissions and in terms of the solid progress being made in China to address greenhouse gas emissions with CCS/CCUS.[9] We focus on the latter because it was a more prominent theme across the conference. Similar to Norway, the Chinese context sees climate change as a crucial problem. A corporate executive from a government-run mining and energy company in China discussed the "social obligation" to reduce emissions. Further, given China's reliance on coal, "clean coal" types of technologies such as CCS/CCUS are very important to its ability to address climate change, reduce greenhouse emissions and use its coal reserves. The 2012 conference coincided with a new Chinese strategic plan that "clearly, and unambiguously identifies CCS and CCUS as a priority in their climate change" plan, according to the CEO for an international CCS institute. Additionally, the president of a Chinese institute on low-carbon energy stated that "we have a strategic imperative in terms of reducing carbon intensity" in China. Indeed, the CEO of the international CCS institute identified the emergence of China in the CCS/CCUS community as an important game changer. He argued, "Don't underestimate China", and continued:

> From my perspective, Chinese commitment and achievement can't be doubted. Now, this is not a threat. This is a big policy duplication for the cost of the technology, and undoubtedly China can, and I'm sure, will play a very large role in lowering that cost of capture, as well as demonstrating a lot of scale, CCS and CCUS, in a range of different industries.

This speaker continued:

> So what about CCS and China? What has the government's response actually been? I would say that it's smart. I would say it's largely been very highly committed. We're very impressed with the reduction of carbon intensity. There are a number of projects underway. You might call them demonstrations. Another colleague from China will present a number of those projects ... and many of those activities are joint activities with other partners around the world, including the US.

As represented by these speakers, the national community of China is positioning itself to be a leader of CCS/CCUS technology nationally and internationally. This leadership is not only related to an obligation within China to reduce GHG emissions, but also related to innovations, scaling, and economizing CCS. Yet, although there is some mention of collaboration with other countries, China's leadership is still framed within a national community context.

Although China's efforts as described by these presenters are laudable and impressive, China's technological development in CCS is primarily geared toward its national GHG emission goals and national interest. Even though China made an aggressive emission reduction pledge at the Copenhagen climate convention in 2009, China was also one of the countries that fought against a legally binding international agreement. More recently, in early 2014, the UN's chief climate official, Christiana Figueres, praised China's national standards and regulations related to reducing greenhouse gas emissions and promoting alternate energy and efficiency (Yoon 2014). Yet, she also noted that climate goals need to "feed the national interest", and that "They're [China] not doing this because they want to save the planet. They're doing it because it's in their national interest" (as cited in Yoon 2014). China, despite all of its efforts to promote, innovate, and deploy CCS, is not motivated by international community, but is rather motivated by a social obligation and a desire to promote its own national community interest. An international legally binding agreement was not something in which China was willing to participate, signalling a constraint to the development of international community. Yet, similar to Norway, international cooperation can play into China's national interest as related to CCS/CCUS, but that is unlikely to come in the form of a formal legally-binding agreement. China's national community context further demonstrates how the national constrains the international, even if there is some interest in the international community.

The conference was not just made up of representatives from national communities, but also included a fair number of international NGOs. In the rhetoric of NGOs, we see attempts to centre the international CCS/CCUS community on economics over the environment, thus tying into the business case theme, but on an international instead of national level. A European NGO seeking to radically lower CO_2 emissions illustrated the discussion of cost as the key stasis point for the deployment of CCS/CCUS. The communication director of this NGO – whose stated goal is to make CCS commercially viable by 2020 – named cost as the key challenge to widespread deployment. Yet, he attempted to turn the economic argument against CCS on its head by arguing "without CCS, it will cost us 70 per cent more to reach our global climate change targets. That is 1.3 trillion dollars extra every single year we're considering. We need to move this [CCS] in the space of being deployable". This presenter subsumes climate change within cost, highlighting the economic costs of climate change as outweighing the costs of deploying CCS. Playing off the Norwegian representative's metaphor, the elephant has been re-located in the room to make way for the 800-pound gorilla. While previous presentations made it clear that CCS/CCUS is a potentially viable, if costly, technology, this European NGO representative reminded the audience that there is a larger goal than simply selling a technology or promoting R&D. The goal remains to reduce greenhouse gas emissions and begin to remediate climate change, and CCS can help meet that goal while also saving money in the long term. In the face of a variety of international policy barriers keeping this technology at bay, this presenter embraced the economic frame and highlighted the global economic consequences of not adopting CCS/CCUS.

Conclusion

In summary, our findings suggest that despite the desirability of creating an international CCS/CCUS professional community to contribute to the reduction of greenhouse gas emissions, the construction of this community always has to contend with and is limited by national community contexts. Our discussion of the differing national contexts between the United States, Canada, Norway and China reveals that national policies and regulations related to climate change and CCS/CCUS have an inescapable grip on the ways that nations can contribute to international solutions. Even non-governmental industries or groups are still bound to the national communities in that they are the entities that make regulations. Yet, as we have shown, it is not as simple as just arguing that the national constrains the international. Rather, our findings reveal the complex boundaries and boundary negotiations and tensions between national and international that happen in the professional CCS/CCUS community.

There are several significant implications from our findings. First, using boundary-work as a theoretical framework offers a powerful heuristic that may be useful in examining similar professional communities involved with low-carbon energy technology and climate change mitigation. As we noted, we see the CCS/CCUS professional community as a representative anecdote for a tension that spans across communities committed to addressing climate change with changes in energy. That tension between the national and international communities may never be resolved, but it is an important tension that must be accounted for and contended with in any consideration of how to address the climate crisis. Further, this heuristic could potentially extend beyond the context of climate change and energy to other issues that involve the negotiation of tension across international and national communities.

Second, studying technoscientific professional communities through our method – rhetorical field methods – offers a unique vantage point from which to examine the everyday, on the ground rhetorical practices of a professional community. In the case of CCS/CCUS professionals, this approach allows for examination of how this group negotiates boundaries in their rhetorical practices among themselves. Evidence of these practices may not be accessible in other forms of communication such as journal articles, websites and other documented texts. The rhetorical field methods approach allows for a unique approach to science communication.

Third, we draw two practical lessons from this case in the spirit of promoting an international community to address climate change through changes in energy practices. As much as globalization and the collapsing of national boundaries are important aspects of the climate crisis, we cannot escape the notion that national communities matter. In the absence of a strong international agency that can create and enforce binding agreements, we are left with influencing the policies of particular national communities. As noted above, this is a conclusion that Figueres of the UN may have come to wherein she advocates that mitigating climate change has to be conceived within national interest. This is challenging, given the variety of national interests involved in such a case, but it does provide some guidance towards possibly more effective solutions. The lesson, in our mind, is not that we give up on an international community to address climate change, but that the challenge lies in doing the difficult work of putting national community interests and contexts more into alignment with a larger international goal. Although we mainly focused on the national community as constraint, we might start to think of how national community can also enable. Norway may serve as a positive example of a national community interest and a set of national policies that are aligned with and promote international community as well. Further, it might be argued that, even in the absence of a binding international agreement, strong national actions from the United States, China and the other largest emitters could set an example for additional nations to follow.

Second, society should be sceptical of turning to industry and the economy to solve the climate crisis. The "business case" conference theme represents an attempt to get around national constraints and the lack of climate change regulations that would enable CCS by turning it to industry to find a way to make it profitable. In addition to showing through our analysis that an international business case is equally constrained by national communities, there are significant risks to a market-based solution, namely that, as Naomi Klein (2014) argues, the global capitalist system is at the root of the climate crisis.

The CCUS/CCS professional community is just one example of a group that is grappling with how to address climate change and energy. This is admittedly only one small sliver of a complex array of issues that constrain an international response to climate change. Yet, in some important ways it can serve as a representative anecdote for thinking through local and global community responses to climate change.

Notes

1 Although the United States and China recently committed to new limits on greenhouse gas emissions, no legally binding international agreement has codified their commitments.
2 A broad spectrum of low-carbon energy technologies have the potential to reduce greenhouse gas emissions, ranging from renewable energy sources, such as wind or solar, to what have been called "clean coal" technologies, such as CCS, that reduce the impact of fossil fuels on global warming. At its best, we see CCS as a suite of transitional technologies that can reduce the impact of coal while society develops a better infrastructure for renewable energy sources and energy conservation.
3 CCUS refocuses the process of CCS to emphasize commercial utilization of the captured emissions prior to, or as part of, sequestering it. Utilization includes a variety of uses, such as carbonation for the beverage industry, enhanced hydrocarbon recovery and others. The utilization most often discussed is injecting captured CO_2 into oil wells for enhanced oil recovery (EOR), which allows

harvesting oil from otherwise inaccessible deposits through a displacement process where the CO_2 pushes out the oil and remains in the ground. For a more detailed discussion of the relationship between CCS and CCUS see Endres *et al.* (2013).

4 For an interesting discussion of the historical development of the conceptual relationship between communication and community, which is beyond the scope of this chapter, see (Depew and Peters 2000).

5 Prior to 2012, the conference was called the CCS conference, but the name was changed to CCUS conference in 2012. See Endres *et al.* (2013) for more on this name change.

6 Of note, many of the technical sessions were more focused on the technical details of these technologies. Research scientists and engineers presented the findings of their research and only briefly, if at all, focused on the societal implications of their findings.

7 The environmental benefits are not necessarily automatic. Although CCS reduces CO_2 emissions from coal-fired electricity plants, its implementation reduces the plants' efficiency, thus requiring emission of additional greenhouse gas emissions to produce the same amount of electricity. CCUS for EOR *reduces* greenhouse gas emissions, but then *creates* greenhouse gas emissions not only through the carbon capture process but also through enabling the further use of oil, another greenhouse gas emitting fossil fuel.

8 While CCS is more viable in the Norwegian context, Norway is open to supporting CCUS as a solution that would work better in other national contexts.

9 In the Chinese context, CCUS is not limited to, or even primarily discussed as a means of EOR. Rather, representatives from a state-run Chinese energy company highlighted the utilization of captured CO_2 for the beverage industry.

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5 How reductive scientific narratives constrain possibilities for citizen engagement in community-based conservation

Leigh Bernacchi and Tarla Rai Peterson

Understanding relationships between scientific and lay discourses

This chapter stems from a desire to understand the relationship between conservation narratives circulating among formally recognized scientific experts and those circulating among the lay public. We were especially interested in clarifying how lay publics interpret and apply scientific narratives within their communities, and how this constricts or expands possibilities for community participation in biodiversity conservation. Public participation in conservation management arguably lends to improved democratic acceptance, contribution and creative and cooperative solutions (Peterson *et al.* 2007; Senecah 2004). To better understand this process, we studied the public interpretation and adaptation of scientific narratives around the whooping crane (*Grus Americana)* in its winter range along the central coastal bend of Texas (USA) (see Figure 5.1). We define environmental communication as the socio-symbolic representation of environment, with the caveat that symbolicity does not render communication immaterial. Second, we follow Peterson *et al.*'s (2007) and Callister's (2013) interpretation of Leopold's land community, which explicitly includes both human and *extrahuman* residents. Although this study focuses on communication between humans, it is important to recognize the possibility of communicative interaction with extrahuman members of the community. Members of this community are social actors (Latour 2004) who sometimes require spokespersons (Peters 1999) to communicate their needs and desires to other members of the community. All have the potential to modify each other's experiences and consequences.

The study builds from the tradition of Wynne (1992) and others who have followed his approach to public understandings of science (Blok 2007; Locke 1999) in that we are primarily interested in improved understanding of the lay public's knowledge, but we do not privilege it as somehow better than formalized scientific knowledge (Durant 2008). As Eden (1996) observed, "the role of science can still be critical, if not determinant, in the more 'participatory' model ... because of the political and cultural demand for scientific rationality" (p. 190). Rather than comparing or contrasting traditional