This thematic issue has set itself the task of conceptualizing how distinct networks and coalitions of actors can shape the core elements of the policy process within any policy sector (or subsystem). The editors’ starting point is Kingdon’s hugely influential framework to differentiate core policy roles in the creation of public policy (Béland, Howlett, & Mukherjee, in press): viz. defining the policy problem (the problem stream), selecting policy solutions to address the problem (the policy stream) and the political effort to negotiate and link viable solutions to particular policy problems (the political steam) (Kingdon, 1995). In this thematic issue and elsewhere, the editors rightly isolate an inherent ambiguity concerning agents operating in these three streams of the policy process – how do actual actors function to achieve these tasks (Béland & Howlett, 2016; Béland et al., in press; Mukherjee & Howlett, 2015)? They take the synthesizing step of incorporating concepts of networks of agents from other public policy frameworks. For the policy stream, the editors emphasize the relatively new concept of instrument constituencies (IC), the analytical heart of this thematic issue; an IC is a set of actors that manage the ongoing relationship between knowledge that is focused on particular models of instruments and their actual implementation.
(Voß & Simons, 2014). The editors plausibly argue that epistemic communities (hereafter ECs, defined here as a network of experts with a particular knowledge of a policy domain and an authoritative claim to that knowledge – Haas, 1992a, p. 3) can serve as the analytical tool for understanding the problem stream within this larger approach.

As Béland et al. (in press) note, however, the EC approach comes from a very different academic tradition, specifically international relations; and its original formulation focused on questions of the utilization of knowledge and power in international relations rather than dissecting the policy process. While it is certainly a reasonable step to reinterpret the approach as an element in a new analytical approach, it is important to explore this new purpose in light of past EC usage. This exploration allows us to take several new important conceptual steps. As the EC approach did not focus on differentiating policy streams or stages, the broader insights that it provides for understanding ICs could be as important as those provided for policy formulation. Such a reflection allows clearer differentiation as to what the EC analysis says about the policy process, and what are the boundaries of the EC and IC concepts.

Framing it as a research question, what does the epistemic community approach, both in terms of its analytical construct and its past findings, tell us about the public policy process and how policy instruments are formulated and implemented? We explore the particular policy conditions and characteristics of the policy instruments (defined here as the tools by which actors implement their governance strategies – Hood, 1983) that make the presence and operation of ECs and ICs more likely, and how this network activity informs the selection of policy instruments and their innovation. Answering these questions enables us to assess the EC concept’s fitness for understanding the public policy process, and what analytical and empirical steps are needed to make it so. What core insights does it offer and how do they differ from those the IC concept provides?

By addressing these core questions, this article makes the following contributions to the literature. First, it takes the original step of assessing the literature’s handling of Haas’ EC formulation and application to public policy and policy instruments, and builds a set of new analytical propositions that allows us to analytically grasp and explore the differences between the two concepts a further big theoretical step in understanding how policies change, focusing on changes of policy instruments and the behaviour of ICs. Accordingly, this work explicitly assesses the EC research outputs and also provides explicit propositions on which to build a future research agenda. Secondly this contribution makes an important first empirical examination of these new propositions so the concepts and propositions can be refined; in doing so, it provides an original examination of United States (US) federal environmental policy instrument innovation through four case studies based on the author’s primary empirical research.

This contribution proceeds as follows. First it compares systematically the EC and IC concepts. It contends that the EC literature has more policy insights to offer beyond simply the problem stream. Section Two explores the EC concept, systematically exploring how past literature has understood the development of specific policy responses and tools for policy problems. On the basis of this review it develops a set of new analytical propositions from which to understand the EC policy contribution. Section Three examines the propositions in light of four US case studies examining the policy instrument innovation. The US federal environmental policy process represents a highly favourable case study for assessing the
possibilities for both ECs and ICs, given the expansive development of new instruments in response to myriad complex environmental problems.

**Conceptualizing ICs and ECs**

In formulating the IC concept, Voß and Simons (2014) emphasize how the IC and EC concepts overlap in their understanding of how actor groups focus on special kinds of policy relevant knowledge. However, they argue that, for ECs, ‘knowledge about a particular (transnational) problem and its possible solutions is in the background, and assumed to be given’ (Ibid., p. 741). As demonstrated in this section, this underlying message (and its consequent argument for the IC concept) is essentially correct: the core element of the EC approach is more the understanding of how the world works than the micro-examination of how instruments impact policy.

Nevertheless, the EC concept is much more open-ended, encompassing and ambiguous than Voß and Simons’ assessment credits it. The focus on particular problems is not always in the background of the EC literature, nor is it always assumed as a given. Also, problems do not have to be transnational to fit the EC framework, a point underlined by this issue's editors in applying generally the concept to policy-making (Béland & Howlett, 2016; Mukherjee & Howlett, 2015). These nuances, however, do not alter the fact that the EC framework has significant limits, nor that ICs can explicate some of these gaps. Nonetheless, acknowledging greater complexities within the EC approach enables us to detail the circumstances (where such networks engage with instruments and their adherents), and the conditions in which knowledge experts shape instrument design and choice, as well as formulate the policy problem.

**The EC approach**

Haas viewed uncertainty as the key characteristic of post-Cold War international affairs, with decreasing state ability to maintain autonomous decision-making (Haas, 1990). How decision-makers organize their experiences and interpret the world shapes the beliefs, ideas and norms that inform the processes generating international policy coordination (Haas, 1989b). Experts and policy actors become crucial, working through a process of intersubjective consensus building, where accurate characterizations of the world are formulated consensually and interactively. This involves an internally defined process of using validity tests to authenticate the community’s knowledge claims (Haas, 1992a, footnote 39).

Haas defined the EC as ‘a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area’ (Ibid., p. 3). The approach shares elements with the Advocacy Coalition Framework (ACF, the network approach the thematic issue editors use to highlight the political stream), namely: knowledge and learning become important under conditions of uncertainty (Ibid., pp. 4–12; Sabatier, 1988). Both network approaches share an importance in the linkage of knowledge and uncertainty. Uncertainty involves two interacting elements: technical uncertainty and political complexity. The first element involves decision-makers lacking adequate information about the policy problem and how they interact with other complex problems over time (Haas, 1992a, pp. 13–14). Underdal (2010) presents a nuanced range of characteristics that challenge governance and that require expert activity:
viz. policy problems that are long-term and multi-generational in their policy trajectory, are embedded in complex systems involving issues of uncertainty, and are often involving large-scale collective goods that have such scope that the policy problems link to a wide range of human activities.

However, significant for discussing policy design is a second uncertainty: the challenge of understanding how political behaviour complicates knowledge and policy interactions. Generating governance co-operation and problem-solving requires recognition of the complexity of international, national and sub-national interactions of political and societal actors (Haas, 1992a, pp. 3–4). Hoornbeek and Peters (2017) argue that political complexity suggests the imperative of a common understanding of a problem whilst technical complexity requires the need for expertise. Nevertheless, a greater understanding of the political dimension may require expertise to navigate it. Policy-makers operating under conditions of uncertainty find it harder to identify potential supportive actors and develop appropriate policy strategies. ECs influence and aid decision-makers by identifying the salient issues and the policy implications that the knowledge has for policy goals. ECs can have specific policy input: understanding underlying cause and effect relationships and ascribing the consequences of actions (i.e. the definition of the policy problem rather than taking it as a given); detailing interlinkages between issues and implications of specific policy choices; assessing the interests at stake; and formulating policies and policy legitimization through evidence (Haas, 1992a, pp. 15–16).

In terms of membership dynamics, the EC and IC concepts overlap further: Haas stresses that ECs do not have to consist of natural scientists or professionals applying the same science methodology (Ibid., p. 16). Instead, ‘what bonds members of an epistemic community is their shared belief or faith in the verity and the applicability of particular forms of knowledge or specific truths’ (Ibid., footnote 4). Haas detailed criteria for establishing an EC’s existence: a shared set of normative and principled beliefs that provide the rationale for action; shared causal beliefs which arise out of analysing policy problems and drawing linkages; intersubjectively-derived criteria for evaluating new knowledge; and a common policy objective (Ibid., p. 3; pp. 11579–11580). Critically, ECs focus on one dimension of how the network/community is bound together, but there are other elements about how networks operate that require insight from other frameworks. For instance, how resources are exchanged to build political power and capacity within the network and how relations and communications function in the networks are detailed more extensively, for example, in the policy network and social network literatures (e.g. Mitchell, 1969; Rhodes, 1990).

Another relevant observation is that the EC perspective does not preclude the presence and cooperation/opposition of other groups that have expertise but lack epistemic claims (e.g. Dudley & Richardson, 1996). A third possibility is that the EC may play its significant policy role, but while operating in a nascent/diminishing or partial state (Haas, 1992a, pp. 31–32; Kapstein, 1992). An EC can transform into an IC over time if the progression of knowledge no longer is central, focused instead on supporting a preferred policy instrument in the governing process. It is also possible for a new EC to arise from this group or to join it. ECs can be national or transnational in scope (Adler, 1992, p. 106). The degree of expert training and reputation, and the persuasiveness of the knowledge, legitimated by respected textual sources, will determine these communities’ degree of access. By comparison, there is no presumption in ICs that a consensual knowledge base needs to exist; advocacy coalitions
are more similar to ECs but also focus less on technical/scientific method and more on common political objectives than ECs (Sabatier, 1998).

Having access to and prestige within the policy system is insufficient on its own for the EC perspective: most importantly the community wields influence through policy process participation, including both micro and macro concerns. Knowledge is also not enough: the EC membership must wield policy-maker power or convert those who do (Haas, 1992a, p. 30). The successful community inserts members (or converts/co-opts policy-makers to its ranks) into positions of influence within the local, national and/or transnational public/societal institutions and organizations (Drake & Nicolaïdis, 1992, pp. 40–41).

The nature of influence may vary too (e.g. a greater role in framing issues, vs. a stronger role in legitimizing decisions). The political context and the stage in the policy process may shape such influence patterns; for example, ECs have particularly strong roles in providing expertise within the European Union (EU) context with respect to agenda setting, policy formulation and policy implementation phases (Zito, 2001). When policy-making is in the negotiation phase, ECs may become relegated to secondary support and legitimizing roles (Drake & Nicolaïdis, 1992, p. 41).

Actual EC activity can be far-ranging beyond defining the policy analysis, solutions or influencing key decision-makers. This includes building a favourable intellectual climate to receive the epistemic ideas, developing key causal analysis, translating epistemic beliefs into a dominating social discourse, accumulating and coordinating essential technical knowledge for the analysis and policy planning, diffusing arguments, encouraging certain vested interests and institutions to favour EC beliefs, raising media and public awareness, lobbying key decision-making organizations, and contributing to the policy agenda (Adler, 1992, pp. 141–142; Adler & Haas, 1992; Antoniades, 2003, p. 26). ECs may also provide political cover by sharing the blame for problematic policy decisions, or by enabling political actors to claim their policies are based on independent expertise (Brine, 2000, p. 268). It is this wide-ranging use of knowledge, expertise and ideas that ECs can provide which require us to assess how such networks influence policy formulation, but also how the policy formulation and knowledge may further carry over into the policy and political streams where tools are developed, contested, implemented and monitored.

**Assessing the EC research record**

Before moving to a direct comparison and application of the possibilities of the EC concept in relation to ICs and policy instruments, it is important to take a step back and look at the EC research legacy. This has both an immediate practical and broader analytical purpose. We can isolate and systemically study the EC research that explicitly and directly speaks to the development of policy instruments and the policy process. Simultaneously, it also allows us to assess the broader EC research agenda findings and indicate where the concept has been successfully used and how it might be adopted in the future.

This contribution takes the original step of assessing the EC published output for their handling of the Haas EC formulation and its application to public policy and specifically policy instruments. It is noteworthy, by contrast, how systematically authors utilizing the ACF approach have been able to examine ACF findings and refine their propositions accordingly (Weible, Sabatier, & McQueen, 2009). No comparable overarching assessment of the epistemic community output exists. Surveying the EC approach, Haas (2007, p. 801) listed
the EC presence of epistemic communities in a range of multilateral environmental agreements, but this focused on international environmental law and brief overviews rather than detailed research findings. It has been argued that the concept has not advanced far since its inception (Davis Cross, 2013; Dunlop, 2000). Accordingly, this work explicitly assesses the EC research outputs and also provides explicit propositions on which to build a future research agenda.

This contribution utilizes Scopus to isolate a significant portion of the peer-reviewed pieces that have had a broader cross-disciplinary impact. Scopus (https://www.elsevier.com/solutions/scopus) claims to be ‘the largest abstract and citation database of peer-reviewed literature’, covering journal articles, books and conference proceedings across all research fields. One of its functions is a rank ordering of research output using keyword by citation numbers. Using the keywords ‘epistemic community’, this author isolated the database’s top 212 pieces ranked by citation number, all pieces having 20 or more peer-reviewed citations dating back to 1970. This enabled examination and categorization of current EC research that have professional peer review quality control and a wider impact on scholars across disciplines and subfields. It is not claimed that the database contains all the highly cited pieces: indeed Haas’ core 1990 monograph and Litfin (1994) do not appear on this list. Nevertheless, the database’s relatively comprehensive nature gives a strong indication of key research outputs.

Table 1 provides a numerical breakdown in two parts. The first section assesses the degree to which the cited pieces explicitly utilize the Haas framework and his detailed criteria. The second separates the pieces in terms of the degree to which they operationalize the

| Category | Distinguishing characteristics | Number of cited pieces in category |
|----------|--------------------------------|-----------------------------------|
| 1. Utilization of Haas framework/criteria (Total publication number: 212) | EC Canon | Publication involves original formulation by Haas and/or the 1992 special issue | 11 |
| | No actual reference to Haas concept | Publication does not utilize the EC concept or Haas criteria | 106 |
| | Concept expansion | Starting point is Haas definition but publication expands criteria in a substantially different conceptual direction | 44 |
| | Studies using Haas concept and criteria | | 45 |
| | Studies using Haas concept but finding no EC | | 6 |
| 2. Existence of a policy focus (Total publication number: 56) | EC Canon overall number: 11 | Publication gives overview or finds no EC *Publication involves Haas’ original formulation with evidence of EC in policy-making | 5 |
| | Transnational analysis overall number: 26 | Publication focuses on transnational EC dimension | 6 |
| | General theoretical approach or passing reference to EC concept | *Publication offers a specific policy analysis | 20 |
| | More policy sector approach overall number: 19 | Publication gives national, subnational dimensions to the community | 10 |
| | | *Publication offers a specific policy analysis | 9 |
EC concept in a detailed public policy analysis, which could inform our understanding of policy processes, ICs and policy instruments. The first section starts by noting the works in the 1992 *International Organization* Issue plus Haas (1989a) that serve as the fundamental canonical pieces detailing the EC approach. More striking is the second row which presents the publications that, despite the key word search using ‘epistemic community’, are not in fact (a) using the EC concept at all or (b) the Haas version of it. A particularly prominent example is Cetina (2009), who conceptualizes the role of ‘epistemic cultures’ and how they shape professional communities. The focus on epistemic cultures and knowledge groups has similarities to but substantially differs from the EC concept. The third row enumerates those works that explicitly identify the EC/Haas concept as a starting point, but then expand or modify the concept in a way that distances their approach from the original Haas concept. For example, Antoniades (2003) ‘reorders’ the concept to express the notion of thought communities, moving away from some of Haas’ criteria. Others expand the concept in a way that more starkly separates it from the original EC concept, e.g. academic disciplines as a whole (e.g. Gherardi, 2009) or even religions (e.g. Sandal, 2011). This article does not dismiss the validity and value of such approaches. Nevertheless, the research generated by this grouping does not constitute an evaluation of the original EC concept and its criteria. Significantly, the amount of work in this category almost equals the fourth row, which is the work that keeps relatively strictly to the EC approach. These publications and the canonical work are broken down into the second section of Table 1. The final row in section one counts the number of publications using the Haas criteria, but that find no evidence for ECs in the case studies they examine.

Aside from the EC canonical literature, Section 2 of Table 1 categorizes the EC output into two categories: it assesses the body of work that explicitly applies the EC/Haas criteria in terms of whether the works focus on ECs with transnational membership or whether the ECs operate within a single territorial boundary; it also differentiates whether or not the output explicitly drills down into the elements of a policy process. Although all of the canonical pieces focus on global co-operation and politics, Table 1 demonstrates that 19 publications embracing the EC approach after 1992 have had a specific country and/or subnational focus. Consequently there is a substantial track record of EC application in policy subsystems, along the lines of the ACF approach. Nevertheless, the weight of the research, particularly with the canonical works included, is on transnational networking. All of the canonical and descendant works that have a specific policy instrument focus are utilized in the next section to formulate analytical propositions. The relatively small size of the group of publications providing research evidence of ECs is striking.

Table 2 itemizes those (both canonical and descendant) 36 pieces indicated by * in Table 1 that provide specific policy evidence/analysis of transnational or national/sub-national ECSs.
for given policy sectors (agricultural policy et cetera). Certain of the categories have been aggregated because of overlapping types of policy and knowledge. Even with this aggregation, the domination of the environmental policy sector as the policy domain where epistemic communities is found is stark. If we include some of the important pieces omitted from the Scopus list, such as Haas (1990) and Litfin (1994), this only reinforces the findings that transnational environmental policy is the favourable and even dominant domain for EC analysis.

This analysis of cited publications stresses a cautionary note about the EC research agenda and its application in this thematic issue. The range of pieces that actually utilize the Haas criteria and conduct detailed policy analysis is relatively small. Nevertheless, this does not negate the potential or importance of this concept for the current policy-making research agenda. This citation analysis shows clear evidence that environmental policy and/or transnational studies have utilized this concept more extensively, but it also shows that more policy subsystem analyses of other areas are possible. This finding mirrors recent assessments of the ‘wicked problems’ concept (i.e. complex, intractable policy problems); they find that this analysis often focuses on the environmental sector and particularly climate change as typical examples without fully grasping the approach; nevertheless the strict criteria still includes non-environmental policy problems such as drug problems (Alford & Head, 2017; Peters, 2017, p. 393). Recent EC literature (e.g. Davis Cross, 2011; Marier, 2008) and Table 2 highlight that the need for expertise does not require ECs orientated solely around scientific methodologies, rationalities and approaches; other expert communities of lawyers etc. are possible.

**Comparing the IC and EC concepts**

Having surveyed the EC approach and output, we now gauge its intersection with the IC concept, and what the comparison says about the development and implementation of instruments.

The core IC notion centres on actors following heterogeneous practices across a range of governance and societal roles. This actor group builds a degree of interdependence that leads them to intersubjectively create particular instrument designs with a set of expectations attached to that instrument (Voß & Simons, 2014, p. 738). To promulgate an instrument, an IC group may have to contribute considerable resources in the form of research and development, experimentation in various processes, knowledge about the instruments and their potential/existing performance, training, networking and marketing the instrument in different policy fora, alliance building, providing material resource support and other possibilities (Foli, Béland, & Fenwick, 2017, p. 11; Simons & Voß, 2017). The EC approach mirrors this understanding of diverse actors in a variety of roles coming together and building mutual knowledge (imbued with particular values) that informs a particular policy approach. The exchange of ideas, knowledge, resources and practices for both ICs and ECs may generate new research fields, types of experts, service industries, public agencies, networks and so forth (Voß & Simons, 2014, p. 738).

Both ICs and ECs can be transnational in scope. Foli et al. (2017) demonstrate that constituency activity can be transnational: an IC promoting the transfer of an instrument across national borders. Equally, the instrument itself may be transnational. As Table 1 indicates, many case studies focus on ECs seeking to create international institutional solutions to
policy problems (Haas, 1992b; Peterson, 1992 etc.). If we accept Krasner’s (1982, p. 186) definition of ‘regimes’ as ‘(i)mplcit or explicit principles, norms, rules and decision-making procedures around which actors’ expectations converge in a given area of international relations’, building international regimes creates structural incentives embedding at least one instrument. According to Krasner and Haas’ definitions, Voß/Simons’ (2014) core illustration, the EU emissions trading scheme (ETS) is an international regime. This instrument binds member states to a common institution and set of rules, and Australia and California have seriously discussed global linkages to the EU scheme.

Significant divergence between the IC and EC frameworks emerges with the Voß/Simons’ postulation that the IC actors and institutions will ‘come to exist for and by the instrument; while they provide for the instrument’s continued existence, the instrument, at least in part, defines their ‘social habitat’ – their legitimate roles in the policy process’ (Ibid., p. 738). Furthermore, while the existence of new policy problems can trigger IC activity in a similar fashion to what occurs for an EC, it is not a prerequisite for IC activity; the IC may have its own internal logic of developing an instrument that does not respond to a particular policy problem (Ibid., p. 738; Sturdy, 2017). Some IC members will develop the specific implementation of the instrument whilst other members will advocate the model in the wider national or international arena (Simons & Voß, 2017).

Embracing a particular instrument does not mean that ICs refuse to condone change with respect to their favoured instruments. In the right circumstances, the constituencies might be persuaded that their instrument could be strengthened by, for example, adding other instruments or new goals (Howlett & Rayner, 2013). The instrument focus nevertheless contrasts with the EC emphasis on knowledge. The EC could, using its knowledge focus, build an approach to an instrument that binds its membership and provides membership identity. While instrument building is conceptually possible, it is pursuit of the knowledge that the epistemic focus gives greater weight. This does not rule out the possibility that an EC can generate an instrument model for a given policy area, and that members build or ally with particular ICs; nevertheless, the EC literature suggests the key binding agent for the EC is the knowledge and knowledge process, rather than the instrument (Raustiala, 1997). This distinction becomes the first proposition: ECs may become involved in campaigning for particular instruments, but this focus will typically be part of a larger approach to knowledge and methodology that more fully defines the EC membership [Proposition 1].

The other two elements of Voß/Simons’ framework are also important. They differentiate instruments in terms of instruments as models and instruments as implemented policies. This distinction is important although ECs, as noted above, can engage in both developing models and implementing instruments. Nevertheless, the distinction alerts us to conceptual differences. The Scopus analysis summarized in Table 1 shows that identified ECs meeting the Haas criteria and conceptualization are relatively rare, partly because the concept sets a relatively high threshold and strict criteria for intellectual coherence (Zito, 2001). It is more plausible to hypothesize that a range of policy instruments will be important enough to generate an instrument constituency to back each instrument; therefore ICs are by their nature likely to be considerably more prevalent than ECs [Proposition 2]. Over time, the IC will continue to maintain and promote the position of the instrument within a policy sector. This does not mean that we take the ability of a constituency to develop around an instrument as a given: Simons and Voß (2017, p. 4) stress the continual effort at work and social interactions that ‘produce, maintain and promote that knowledge’.
Because ECs largely focus on understanding evolving problems and developing knowledge and methodology to cope with these problems, we expect that most ECs will view their core activity as developing the instrument model to better respond to the core policy problem. Thus, over time, the EC is less likely to focus its core activity on all aspects of implementing policy instrument than an IC would [Proposition 3].

Importantly, EC members may engage in micro-level details of applying the instrument to the policy problem and view this as a core epistemic mission. This is theoretically possible although not essential to the EC’s functioning; in wishing to acknowledge this theoretical possibility, this contribution differs from the thematic issue’s overarching approach. Nevertheless, the instrument is not the core EC focus; consequently, over time, the typical EC is likely to move onto new understandings of the problem and/or wind-up the efforts and focus on new problems. Wurzel, Zito, and Jordan (2013) reviewed 40 years of environmental policy instrument design and selection for four EU countries and the EU and found that it is hard to kill policy instruments. Even regulations, which neoliberal and other ideological agendas have claimed as unnecessarily burdensome to economies, have proved remarkably resilient and flexible. This flexibility and persistence is partly due to the preferences of policy-making and societal participants and clientele who constitute the IC for these instruments. Consequently, ICs are more likely to persist with the micro, long-term detail of maintenance and implementation of policy instruments than ECs [Proposition 4].

While ICs may be stable in supporting instruments, Béland and Howlett (2016, pp. 402–403) argue that the IC membership may change rapidly over time, especially when the policy-making arena is open to the influence from different actors and to the force of IC leadership. However, the IC itself will stay relatively cohesive and separate over time due to the loyalty to a particular tool, its idea or a combination of the tools in the way that an EC maintains cohesion around a core paradigmatic, epistemic view of the policy problem (Mukherjee & Howlett, 2015).

The last element of Voß/Simons’ (2014) framework differentiates between functional (expectations that the instrument achieves particular public goals) vs. structural promises. Structural promises are expectations about the institutional consequences of instrument adoption. Voß and Simons expect that various IC members will focus on different promises, but both motivations and efforts contribute to maintaining the IC. Although less explicitly articulated, the EC approach contains the possibility of different EC members focusing on core knowledge while others prioritize practical implementation. The difference comes in the fact that the EC concept expects all members to accept a particular ideational approach to a policy problem, which need not happen in an IC.

**Further ECs instrument propositions**

This section explores what the past EC literature adds to understanding how expertise influences the policy-making process in general and more specifically policy instrument development. Within the 36 publications surveyed in Table 2, 20 of these pieces do not focus on instruments or distinct elements of the public policy process (e.g. Coleman & Skogstad, 1995; Davis Cross, 2011; Dudley & Richardson, 1996; Gough & Shackley, 2001). Nevertheless, the remaining 16 pieces provide useful insights in policy instrument development.
First, we need a clearer sense of the kinds of policy tools and the nature of that policy process. Hood’s (1983) classic typology differentiates four essential governance means for manipulating resources to achieve policy aims: information (either released to motivate a target audience or collected to guide policy), authority (involving legal, hierarchical powers), finance (using monetary incentives and disincentives, such as subsidies and taxes) and organization. Given its focus on the role of both organization and other resources such as rules and money, international regimes studies mesh well with this typology.

To focus further the insights about instrument design and implementation, this contribution assesses the EC link to instrument development, using the organizational device of policy stages or steps. This heuristic approach to seeing public policy in discrete steps sacrifices nuance to provide clear dimensions of the policy process (Jones, 1970). Accepting the limitations of such a heuristic approach, and the reality that the policy process is often non-linear, non-sequential (e.g. instruments precede the problems) and interrelated (Kingdon, 1995, we conceive the policy process as involving these stages: (1) problem framing and definition, and setting the problem definition on the agenda; (2) designing solutions and placing alternative solutions on the agenda; (3) evaluation of solutions, the selection and design of the eventual policy solution; and (4) application, implementation and evaluation of the instrument.

Turning first to setting of the policy problem and instrument solution on the agenda, Adler’s (1992, pp. 111–119) study (nuclear arms control regime) and Drake and Nicolaidis’ (1992, pp. 47–53) investigation (international trade instrument/regime) are illuminating. Both cases demonstrate that engaging with actors who wield political power (by allying with sympathetic interests, converting decision-makers to the epistemic position or placing epistemic members in the organizational ranks) create necessary conditions for the new instrument to be placed on the political agenda [Proposition 5]. The arms control community engaged heavily with and participated in the Kennedy Administration, and built key relations with US Senators and the national press (Adler, 1992, pp. 124–133). Eventually the definition of the national security problem was linked with their epistemic beliefs and the EC developed arms control as the policy instrument. In building groups with research interests in academia and policy institutes, placing actors committed to arms control throughout the US executive, and populating the US system with its members, the EC created an IC around the arms control idea. In the trade case, the Anglo-American EC persuaded the US government, which placed the issue on the problem agenda of GATT and used the threat of bilateral agreements to pressurize the other delegations (Drake & Nicolaidis, 1992).

More recent literature supports this agenda setting perspective. Two separate studies found evidence of an EC seeking to mitigate acid rain problems (Lidskog & Sundqvist, 2002; Zito, 2000). Supporting Proposition 5, the EC invested substantial effort in converting Scandinavian ministerial officials into United Nations negotiations champions of the approach (Zito, 2000, pp. 66–70). Marier (2008) reinforces the importance of having political actors who have both familiarity with the policy area and political resources in enabling the ECs to influence processes, particularly processes of high political visibility and sensitivity such as pensions. Dunlop (2010) raises an interesting possibility that decision-makers may choose to create ECs to provide certain expertise, and might place more trust in such groups because of this selection process. All of these observations about political engagement caution us about too neatly separating the political from the problem stream.
Turning to solutions, the arms control and trade cases suggest the fundamentally equal importance, in the design of instruments, of the communities developing not only broader principles but also core data about the policy issue and technical, micro elements of the instrument design [Proposition 6]. The arms control community developed the technical knowledge to support both the problem definition and the solution design, including specific norms and rules, means and processes of verification as well as articulating US interests and negotiating positions (Adler, 1992, p. 123). In the trade case, the other participating states needed data about the nature and scope of services transactions, the likely results of any agreement for their national policies and details about the process and implications of any trade reforms, all of which the EC developed (Drake & Nicolaïdis, 1992, pp. 55–56).

EC influence is also found in the instrument argumentation and selection stage. The Mediterranean Pollution regime and the stratospheric ozone regime cases suggest the importance of ECs in gathering data, for instance on chlorofluorocarbons, in persuading the political actors to enact these solutions; this is in addition to controlling the thinking in key decision-making channels (Haas, 1989b, 1992b). Jacobs’ (1998) study of the New Zealand civil service emphasizes the EC role in developing and marketing accounting governance solutions. In contrast, Dunlop’s (2009, p. 301) study highlights the limitations in the EC impact on decision-making. Decision-makers had their own independent sense of the field and key policy objectives, influenced heavily by environmentalist concerns and wider political considerations. Decision-makers used this, including some of the EC’s outlier findings, to block the EC’s steering (Ibid., pp. 301–305). This case study suggests the possibility that decision-makers with independent knowledge and means of learning and achieving their policy objectives may be more resistant to particular ECs and ICs (Proposition 7).

Some of the most interesting EC research findings illuminate the implementation and evaluation stage. Although he finds no fully-fledged EC, Kapstein (1992) stresses that the reflection period after an instrument choice is an auspicious time for assessing the values and thinking behind the instrument, as the instrument and its constituents deal with the implementation aftermath (including the potential for crises). In their analysis of biobanks and bioethics, Salter and Jones (2005) reveal how the rising policy and political value of biobanks has created a feedback process where the model of bioethics has been challenged by growing concerns such as citizenship rights over the biodata. The community around bioethics faces a challenge of whether the problem definition, and the solution’s implications, can be retained, with these changes altering the EC membership of the community and the focus of its values. This evidence suggests that changes of the valuation of the instrument and its societal/policy impact may bring EC influence more into prominence (Proposition 8).

Hopkins (1992) examines the revision of an existing instrument; his food aid case emphasizes the reality that understandings of both policy problems and the policy response may change over time, particularly in the assessment period. Hopkins views the EC’s progress as being unavoidably gradual: the role of consensual knowledge building is necessarily incremental rather than synoptic and sudden (Proposition 9). The EC members coalesced around a series of publications and seminars focused on prioritizing food security goals, having emerged with a growing epistemic consensus in the 1970s–1980s on the linkages between population growth, food needs and environmental pressures (Ibid., pp. 236–240).

Through a gradual process, the EC criticism and new ways of thinking triggered an evolutionary revision to the aid regime. Critical conditions for this happening were the moments where the IC and vested interests in the food aid regime retreated or diminished.
their voice (Ibid., p. 251). This finding suggests that weakening of the voice of the current IC due to changes in circumstances is a core condition in enabling an EC outside the status quo to challenge the original instrument's assumptions and design (Proposition 10). Peterson (1992) stresses that the moments of policy influence for an EC are rather sporadic, reinforcing the notion that this influence requires gestation over time. Part of the issue may be the EC’s internal characteristics: both Peterson (1992) and Chwieroth (2007), studying neo-liberal economists, stress that attaining and maintaining ideational coherence within the EC is a long-term prospect that constrains EC influence.

In the acid rain case, the EC developed a ‘critical loads’ approach that measured and indicated clearly the pollution levels that a particular ecological region could sustain before significant, long-term harm occurred (Zito, 2000, pp. 66–67). This analytical approach enabled a synthesis of scientific thinking and data that informed the UN Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution (LRTAP). LRTAP includes an iterative tool for altering the regime and also uses the critical loads analysis to evaluate the Convention. The later iterations of the Protocol have increasingly accepted targets more in line with the critical loads analysis and monitoring (Lidskog & Sundqvist, 2002, pp. 90–92). The evidence of this case raises the possibility that gradual, consensus-based production of epistemic knowledge and influence is enhanced when the instrument has processes of reflection and revision inherently built into its implementation process (Proposition 11). Table 3 summarizes this and all of the other propositions below.

**US Environmental instrument development**

**Rationale**

In order to assess the propositions’ validity and the EC role in policy instrument development, this contribution now focuses on assessing US federal environmental policy innovation (i.e. the adoption of new policy instruments and/or the modification of extant instruments). Several dimensions inform this choice. Environmental policy has seen the increased usage of ‘new’ policy instruments since the 1970s (Wurzel et al., 2013), and the US has pioneered some of this innovation. Likewise, prior EC research underlines how environmental politics and policy provide favourable EC conditions. Consequently, US federal environmental policy constitutes a favourable case for assessing the potential existence of both ECs and ICs; these conditions are more likely to reveal the presence and characteristics of both network types.

This contribution pursues a further threefold strategy. It selects instruments across the Hood typology, selecting across a range of instrument cases (rules, markets, information). The case selections also assess instrument designs that vary in technical complexity. Finally, accepting the premise that instrument innovation is not a single policy moment but rather a political act evolving over time (Voß & Simons, 2014), this contribution centres three case studies around a brief history of the 1970 US Clean Air Act (CAA) – a complex regulatory framework. To improve the Clean Air Act, the US Environmental Protection Agency (USEPA) instituted the complex Sulphur dioxide (SO₂) ETS whilst also pushing voluntary instruments that utilize environmental information: e.g. Energy Star, the third case study. A fourth case study involves an instrument outside the CAA realm: the Environmental Performance Track. The ETS involves considerable design complexity while the structure of the informational instruments is relatively simpler.
Given space limitations, the text only gives a brief chronology of the network operations for each instrument, to assess the evidence for the propositions summarized in Table 3. The qualitative research relies on the author’s empirical comparative environmental agencies study (Leverhulme Trust Fellowship) including primary documentation and 54 anonymized elite interviews. The 54 respondents, collected between 2007 and 2017, include current and former USEPA officials, other federal agencies such as the Office of Management and Budget (OMB), interest group representatives, analysts and foreign observers.

**Regulation and the innovation of risk analysis**

One of the realities in US federal environmental policy is the continuing importance of particular pieces of command and control legislation, such as the 1970 CAA (although it is a revision of a 1963 Act). This legislation had further major revisions in 1977 and 1990 (USEPA, 2017a). The interviews do not suggest a formal network around the Act, but certainly indicate core elements of at least one IC with one ‘node’ involved in the administration and another seeking to protect the environmental ambition of the legislation (USEPA official, 13.9.2007). Focused on creating ambient air standards and getting states to develop emissions plans, the CAA strongly emphasized rules and deadlines. This regulatory approach has been supplemented by other types of instruments (creating a larger policy mix), but the rules emphasis remains important.

However, the rules approach has undergone innovation: a number of federal officials have highlighted as a critical instrumental innovation the rise of risk assessment (e.g. USEPA officials, 13.9.2007, 16.11.2017, 8.11.2010; OMB official, 24.11.2013). The interviews and secondary literature suggest a diffuse group of interested policy-makers and analysts rather than a cohesive EC or IC, which is more problematic for the EC criteria; an important context was David Stockman’s and White House efforts at regulatory reform. The USEPA (2017c) itself credits the National Academy of Sciences’ risk assessment model, but perhaps more significant was the USEPA Administrator, William Ruckelshaus, pushing the agenda for using risk information to establish priorities within the policy processes and instruments. His successors, Lee Thomas and William Reilly in particular, also pushed this (USEPA official, 16.11.17). The USEPA commissioned agency and outside experts to rank risks, and then promoted a series of risk projects in the late 1980s-early 1990s (Fiorino, 2014).

The activity in various USEPA divisions and within the states indicates an IC being created within the agency to work on this, but simultaneously other federal agencies were also undertaking risk analysis and building ICs. This suggests a broad policy shift involving quite a wide actor network. A loose but substantial aggregation of actors in the environmental and political arena including US Congress remained sceptical about the values behind the approach (USEPA, 2017d). This provided the context for USEPA Administrator Carol Browner downgrading the focus at one point. However, later in the history both the Clinton and George W. Bush Administrations pushed a greater role for the OMB in overseeing the process and giving greater scope for risk analysis. More broadly, this risk innovation has become enmeshed in the question of how administrations assess environmental priorities and this has led to battles between the EPA and OMB and other elements of the executive. Certain USEPA offices, notably the Office of Air and Radiation, were relatively receptive to the approach over time and had available a wide range of data to build analytical cases (USEPA officials, 13.9.2007, 16.11.2017, 8.11.2010).
**SO₂ Emissions trading**

The 1990 formal revision of the CAA added a new policy instrument into the mix in this sector, emissions trading. The core idea is that the system allocates pollution rights in the form of emissions allowances which then can be traded in the market that the instrument creates. ETS represents the core prototypical case for the IC literature (Voß & Simons, 2014), so there is evidence for such networks at the transnational level. The EC input in developing this instrument is less clear cut. Lane (2012) makes a persuasive case that a group of economists, which meet the EC criteria, had shaped a discourse promoting the efficiency of ETS over the supposed inefficiency of regulation. Some economists in this community explicitly attacked the CAA’s standard-setting approach in favour of incentive-based measures. This EC laid an intellectual foundation and a questioning of the CAA design, but it seems only diffusely related to the key actors behind the CAA innovation.

The USEPA Air Office developed within the organization a range of expertise and knowledge about policy instruments and data (USEPA official, 13.9.2007). In the mid to late 1970s, the Policy Office contained within the Air Office worked on ETS, including some of the practical building blocks such as the ‘bubble’ approach to aggregating emissions (USEPA official, 19.11.2013). This EPA group did not manage to generate momentum, which came from outside the Agency. Several key actors within the non-governmental organization Environment Defence Fund (EDF) including the economist Dan Dudek (a member of the economist EC working on ETS) decided that an ETS system could better tackle the growing problem of acid rain (Pooley, 2010). This EDF effort attracted the White House’s attention, particularly a key George H.W. Bush advisor, Boyden Gray (USEPA officials, 17.11.2011, 19.11.2013, 7.1.13). When this first Bush Administration took office and desired to turn the acid rain issue into an environmental achievement, these actors saw the opportunity to use the revision of the CAA to bring this idea forward. Elements of the USEPA Air Office worked closely with this group, both in terms of the design and the provision of data. The instrument had the backing of the White House and Administrator Reilly, who pushed for it in the Congressional Hearings and decision-making of the bill; the coalition had also managed to recruit some sympathetic Congressional members and even an industry executive to its ranks (Pooley, 2010).

In assessing this ETS coalition, it very clearly fits the IC criteria, with some actors pushing the overall vision and others working on the practical issues. It is more debatable whether this constitutes an EC, but there is an intellectual core of harnessing market mechanisms for environmental protection that does fit. On this ETS case the IC and EC concepts overlap. Less persuasive is the argument that this was a community with a cohesive world view. Interviews and other accounts suggest a looser network with a very solid core of leaders who pushed the instrument hard (USEPA officials, 16.11.17, 19.11.2013, 13.9.2007, 17.11.2011). However we label the group, the perceived success of the CAA helped create multiple ICs favouring the expanding use of ETS more broadly in the US and the international environmental agenda. In the transfer of the ETS idea to the problem of climate change, the trajectory of the instrument has intersected with another EC identified by scholars: the core scientific communities found in the Intergovernmental Panel on Climate Change (e.g. Gough & Shackley, 2001). Nevertheless, this scientific community focuses more on assessing data and research to build a picture of the climate change problem.
**Energy Star**

In a different effort to promote emissions reductions, the USEPA Air Office turned to other instrument possibilities. Air officials convinced USEPA Administrator Reilly that pollution control was not enough and that information could be harnessed to incentivize firms to voluntarily prevent pollution. With the first example occurring in Germany in 1978, eco-labels provide consumers with standardized information about the environmental impact of products and processes (Wurzel et al., 2013). Air Office advocates managed to persuade Reilly to create the label, Green Lights, to address light bulbs. Its success led the USEPA to develop other tools, including Energy Star. Officially started in 1992 in the Clinton Administration, the USEPA programme initially targeted computers. The USEPA plan was going to introduce a label covering a limited range of computers, but a representative of other computer companies contacted the USEPA office to say that they all would embrace the label (USEPA official, 16.11.17). The EPA has expanded the programme’s scope to include 35 product categories and buildings, with partnerships with over 18,000 private and public sector organizations (USEPA, 2017b).

The amount of participation and commitment to the label suggests a very diverse, multi-faceted IC has risen to benefit from the Energy Star programme. Interviews with officials promoting Energy Star suggest that the actors promoting the ecolabel were a relatively diverse group united by the principle that voluntary programmes were worth trying. This loose grouping does not constitute an EC although there is evidence of at least one intersection between the instrument and such a group. Inspired by the psychological/behavioural economics approach of Thaler and his thinking on ‘nudge theory’ – the use of positive incentives to voluntarily incentivize actors (Thaler & Sunstein, 2008) – the Obama Administration established the Social and Behavioral Sciences Team (SBST) in 2015 to apply the nudge approach (SBST, 2015). The SBST specifically raised Energy Star as an example of nudge and involved itself in a parallel effort to build a Home Energy Score (the energy efficiency profile of a house) with the Department of Energy, in order to help tackle climate change (SBST, 2016). With other governments across the world developing similar teams, the nudge approach qualifies the actors as an EC focused on thinking through instruments using an agreed paradigm. This community is particularly interesting as it is at the border of the EC and IC approaches, with the focus on applying the approach to converting old and creating new instruments. The arrival of the Trump Administration has seen some major developments: the SBST team disbanding in January 2017 and a proposal to de-fund and even privatize the Energy Star Program (Frisbie & Kantor, 2017).

**Performance Track**

The USEPA Administrator Browner and the Clinton Administration continued the move towards information instruments by turning their attention to corporate governance. Developed in the 1970s, US corporations became interested in coping with the rising frequency of major industrial accidents and started a voluntary audit process to better govern their internal processes (Wurzel et al., 2013). These instruments became known as environmental management systems (EMS). Various international organizations such as the International Chamber of Commerce and the International Standards Organization provided a diffuse IC promoting global EMS application. Diverse US advisory bodies, such as the Aspen Institute and the National Academy of Public Administration, and certain US
state EMS programs provided an intellectual context for the USEPA to launch the National Environmental Performance Track (Fiorino, 2009).

There is no evidence of an EC driving this instrument, but the rather diffuse network inside and outside the USEPA would qualify as an IC (USEPA official, 3.11.2009, 7.11.2017). Indeed, the Performance Track members created their own Performance Track Participants Association and held conferences; although it had engagement with the USEPA, the group constituted its own self-organizing IC or a tight membership community within a looser IC. Despite the uptake of 550 facilities, USEPA Administrator Lisa Jackson decided to terminate the programme in 2009, arguing that USEPA resources needed to be placed into regulatory enforcement rather than such voluntary programs (USEPA official, 3.11.2009).

Summary of propositions and evidence

Assessing what the case studies tell us about the propositions (see Table 3), they reveal a much greater prevalence of ICs than ECs. It can be argued that this is not too surprising given the case study focus on instruments, particularly the CAA. Nevertheless, the CAA witnessed a range of problem re-definitions, including the recognition of acid rain and climate change problems; consequently there were favourable conditions for ECs. The two ECs that the case studies identify, however, also fit the IC criteria, raising a question about how clean the conceptual break is between the two network concepts; creating and converting instruments was the aim for both communities. The EC activities do conform with the expectations that the EC will not be involved with all the aspects of implementation and furthermore will keep a wider engagement with the pursuit of broader knowledge (promoting ETS and nudge principles).

On the issue of the decision-makers’ role, the four case studies find that the backing of the USEPA Administrators and the White House was vital, and these actors featured in the communities promoting the instruments. The empirical examination has not systematically assessed the role of data, but the interviews of both USEPA officials and outsiders depict the Air Office as being unusually effective compared to the other USEPA offices in gathering and harnessing data to make their policy cases. Observers are questioning the motivation behind the potential changes in the Energy Star programme, but the case of the Performance Track strongly illustrates the scenario where a top Obama executive, motivated by promoting environmental protection, had a different knowledge-based view and terminated the programme. As already indicated above, the evidence for proposition 8 is not particularly strong, but the overall CAA trajectory, with the rise of understanding of new pollutants and conditions does suggest that such a dynamic can be in action. Both emissions trading and the eco-labelling involved an incremental building of an intellectual and practical case, but there is no evidence of a weakening of the ICs involved with the CAA or the other instruments which then triggered an epistemic case. Indeed, the ICs in all the cases seemed at the time of the innovation to be in a strong position, with the new design and knowledge adding to the instrument. All USEPA instruments go through evaluation, but it is notable that the CAA gives a legal platform for redefining the air pollution problem in a way that justifies altering the instrument. The final observation is that the differences in instrument type and degree of complexity within the case studies did not have an effect on the presence of ECs and ICs. All four cases have ICs, and the much more complicated ETS structure and the simpler Energy Star saw some EC involvement.
**Conclusions**

This contribution has a number of objectives in assessing how the EC helps explicate the public policy process and how policy instruments are formulated and implemented. The analysis reviewed here does suggest, in line with the thrust of the thematic issue, that the EC concept can make a particularly strong contribution in understanding how actors frame policy problems and understand the policy issues. It does so because the problem of uncertainty in decision-making is not merely restricted to gaps in scientific knowledge but is a more pervasive challenge that governance faces in the complex global society.

Nevertheless, the EC concept, which was not focused originally on dissecting public policy cycles, does offer a richer, more nuanced sense of how public policy and instruments develop. On both counts it is worth investigating what insights the EC concept can provide for understanding policy instrument development. The review of the EC findings suggests that the EC influence varies over time given the dynamics inside the EC as well as the external constraints and opportunities. The literature suggests that the problem definition stage sees the most evidence of EC activity, but also indicates that it can occur at all stages of the process. Given the long trajectory of instruments and the constituencies that promote and maintain them, they go through a cycle of implementation and evaluations where changes in understanding problems and changes in policy values may occur. Thus, ECs may be quite influential in the implementation and re-evaluation stages. The CAA history bears out this scenario.

However, the review of EC literature suggests (particularly compared to the ACF tradition) that the EC conceptual innovation and detailed research evidence is much more limited.

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**Table 3. Summary of the evidence for the propositions.**

| Propositions                                                                 | Case evidence                                                                                                                                 |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1. ECs may campaign for instruments but normally within a larger drive to knowledge. | In the ETS and Energy Star cases, the networks arguably were focused more on the instruments, questioning this proposition.                    |
| 2. ICs are more prevalent than ECs in the policy process.                     | Distinct ICs can be found in all of the cases, but at best the case can be made for ECs operating in ETS and Energy Star.                        |
| 3. ECs are less likely than ICs to focus their activity on all the aspects of developing instruments. | The ETS community did not manage all of the complex ETS developments, and the Nudge EC only incidentally linked to Energy Star.                |
| 4. ICs are more likely than ECs to invest in the long-term policy instrument maintenance. | ICs supported all of the cases, and were more involved in all aspects of the Energy Star and SO2 ETS implementation.                        |
| 5. Successful ECs need to either convert or enlist decision-makers.            | The Nudge EC had Obama and his White House as a general backer, and the EPA Administrators, particularly Reilly, pushed hard for the innovations. |
| 6. ECs can influence the instrument adoption by providing data in addition to broader principles. | Cases do not reveal detailed evidence of this, but do not refute the proposition.                                                           |
| 7. Decision-makers with independent knowledge and policy means may be more resistant to ECs and ICs. | USEPA Administrator Jackson ended Performance Track in favour of a stronger regulatory approach.                                             |
| 8. Over time as instruments evolve societal values and perceptions may shift giving the EC opportunities for influence. | Limited evidence, but the new concerns and understanding of climate change as air pollution have re-directed the purpose of the CAA, even if not the design. |
| 9. The role of consensual knowledge building is necessarily incremental rather than sudden. | All the instruments required incremental development.                                                                                       |
| 10. A weakening IC enables an EC to challenge the instrument design.           | Case study evidence does not lead to accepting or rejecting this proposition.                                                                |
| 11. If the instrument design contains processes enabling reflection, ECs can be more influential. | The 1970 CAA contains provision for dealing with new pollutants.                                                                              |
that one might expect from such a popular concept. In part because it has been shared across many disciplines, as the Scopus citation list shows, there has not been that systematic effort (with a few exceptions such as Dunlop, 2009, 2017) to build analytical propositions. This contribution has sought to create such propositions to explore the particular conditions operating in the policy context and certain characteristics of the policy instruments that make the presence and operation of ECs and ICs more likely, and how this network activity informs policy instrument selection and innovation.

In terms of frequency (i.e. how often the dynamic is likely to appear in the policy sector) and scope (i.e. the degree to which the concepts provide an essential condition for governance change), the EC literature review and the case studies suggest that epistemic communities defined according to Haas’ strict criteria are relatively less common than other networks. Nonetheless ECs can and do occur. The nature of policy problems is such that expertise and explanations that make sense of the policy world are and will continue to remain important; the necessity of epistemic knowledge remains imperative.

Facing that reality, it makes sense to explore more thoroughly the analytical possibilities of ICs, ECs and other expert networks. The ETS and nudge networks suggest that there remains some necessary conceptual overlap. As the case study was more focused on the environmental instrument, the nudge community merits further study to explore the threshold that makes it an epistemic community. This contribution argues that the focus on the overarching principle of the policy benefits of nudge and its grounding in behavioural economics differentiates it from many of the ICs considered in the cases. Alternatively it might make sense to see the nudge community as an IC containing an epistemic core unit or even EC.

The contribution, in addition to the conceptual relating of the EC to IC types, raises more fundamental questions about the direction the EC approach can take. One highly prevalent approach in the literature is to expand the Haas concept and criteria in new directions and new networks understandings (treating the EC as policy network, discourse coalition and so forth). This approach is intellectually valid, but there is an overarching problem: the variability of usage makes it difficult to create a wider set of findings on such diverse conceptual understandings. Conceptual confusion also results. The second approach (which some scholars follow: e.g. Coleman & Skogstad, 1995; Dudley & Richardson, 1996) is to populate the analysis with other network concepts and their different analytical foci – i.e. not just ECs/ICs/Advocacy Coalitions but also discourse coalitions, policy networks, policy communities and so forth. Such an approach allows clearer analytical distinctions to be drawn across policy studies and the opportunity to build on past research. A third approach would be to insert more network thinking into the original EC approach but demarcating it with new labels. For example, following Rhodes (1990) approach, we could differentiate the original cohesive EC from a much looser network following a particular world view – an epistemic network, or an epistemic core/team within a larger policy network. The most plausible labelling of the ETS group might be as an IC with a maverick and powerful EC team/group operating within it.

Whichever analytical direction is selected, the evidence is clear that policy research requires a more systematic assessment of EC policy activities and more empirical work. In doing so, we need to more systematically examine cases that do not involve scientific uncertainty and are outside the environmental policy sector.
The environmental case studies indicate some favourable conditions for EC influence as well as give a sense of the evolution of instruments. Radical instrument replacement did not happen in the case studies, which partly can be attributed to the presence and active effort of ICs. Instead, an incremental adjustment and accumulation of instruments are likely to be the more common response to how public actors govern in the modern era. The CAA has witnessed considerable evolution over the decades and it is in the periods of reassessment that the knowledge of new problems (acid rain, climate change) and policy understandings took hold. All of the instrument innovation required the strong support of USEPA Administrators and often explicit White House backing; this reinforces the need for ECs and similar groups to engage and ally with political power. Having an energetic bureaucratic department that has concentrated tremendous effort on data gathering and evidence was a very important condition for promoting policy change. Nevertheless, it is appropriate to stress that the case studies warn that political leadership with sufficient power may disregard ICs and diminish or discontinue instruments. Instruments are not irreversible, and the motivations can be based on differing epistemic and value approaches.

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