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Transnational Policy Networks and the Role of Advocacy Scientists: From Ozone Layer Protection to Climate Change

by Reiner Grundmann[*]

International regulations for the protection of the ozone layer seem to be effective. The Montreal Protocol (MP) is a much celebrated success story in international environmental policy making, and rightly so. The Montreal Protocol served as a role model and trigger for the climate change dispute. Regarding the environmental threat posed by climate change and ozone depletion and their public perception, it has been observed that 'the ozone hole has arrived as a concept in the US public's consciousness, but the greenhouse effect is entering primarily as a subset of the ozone hole phenomenon, the closest model available.' (Kempton et al. 1995). But so far, climate change negotiations have not quite moved onto a similar path of successful environmental governance. To be sure, the failure of reaching an agreement in The Hague in November 2000 was followed by a compromise in Bonn in July 2001 and further progress in Marrakech. However, the fact that the United States has withdrawn from the Kyoto Protocol highlights the serious obstacles that climate change policy faces. Comparing the landmark agreement of the Montreal Protocol with the Kyoto Process, the latter pales in effectiveness.[228] What are the reasons? There is a preliminary and obvious answer. As one commentator put it, 'perhaps one reason why expectations were so high [in the climate change case] is the success of negotiating the Montreal Protocol… Environmental NGOs and negotiators moved from ozone to climate change, many of them expecting the second shot to be much like the first one.' (Ted Hanisch quoted in Rowlands 1995: 259). But is that all one can say?

From Kyoto to The Hague: Deadlock

After the 1992 Framework Convention on Climate Change (FCCC) was passed in Rio, it took several years before the international community agreed in 1997 to a protocol of binding measures in Kyoto. In the protocol, the industrialised nations pledged that they would by 2008-2012 reduce their emissions of greenhouse gases by 5% based on 1990 levels. The countries with the highest emissions committed themselves to a reduction of 6-8%. This was a starting point which, however, does not yet come close to the range of reductions which would have to be put in place if climate change were to be prevented. According to scientists working with the IPCC, carbon dioxide emissions would have to be cut by more than 60% in order to stabilise climate on present-day levels (Houghton et al. 1990; Wuebbles and Rosenberg 1998).

In the run-up to the Kyoto Protocol the participants found themselves in a deadlock: on the one side were countries willing to take action, on the other were countries against. Among the first group was the EU, among the second countries like the US, Canada, Australia, and Japan (later known as the 'umbrella group') but also developing countries. The opponents of strict regulations used scientific uncertainty as an argument to legitimise their reluctance.[229] In Kyoto, a compromise was reached which mandated targets and timetables, leaving the implementation (including "flexible mechanisms") to further talks. In the run-up to the talks in The Hague, the EU and the umbrella group found themselves in a different kind of deadlock (with the developing world standing aside, for the time being): both disagreed about the extent to which flexible mechanisms should be allowed to reduce emissions. At The Hague, EU countries and the United States did not seem to disagree heavily over the reality of human-made climate change and the need of mitigation, but over the best way to achieve this goal, or--to stick with the official language--to maintain the 'integrity of the Kyoto protocol'.[230] The EU accused the umbrella group, especially the United States and Canada, of trying to exploit loopholes. The positions were not based on different

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[228] For the notion of regime effectiveness, see Miles et al. (2001).

[229] In the US, groups such as the Global Climate Coalition, Citizens for a Sound Economy, Western Fuels Association or the American Petroleum Institute funded skeptical scientists who attacked findings of the intergovernmental panel on climate change, IPCC (see Balling 1992, Michaels et al. 1995; Singer 1996).

[230] Before the start of the conference in The Hague, a consensus was reached on what previously was a contentious issue: whether climate change exists at all. Most players seemed to agree that the Earth is warming up and that this will eventually have negative impacts on ecosystems and society unless governments take action now to reduce emissions of carbon dioxide. It seems as if the US has now moved away from this consensus.

scientific models or different orientations in principle: both sides agreed that something had to be done in order to mitigate climate change. It was a matter of agreeing on the appropriate measures where the conflicts arose.[231] Interestingly, the advocates of the environment were divided (as was industry) with some US environmentalists supporting flexible mechanisms (such as carbon trading and reforestation) proposed by their government.[232] On the other side there were more radical environmentalists supporting the position of EU countries who suspected the United States to aim at a cheap deal.

Over the course of the last decade, the US reluctance has wavered between a principled objection to a climate treaty as such and an acceptance of it provided that the perceived burden on the US economy was kept at a moderate level. Presidents Bush Sr. and Jr. exemplify the first position, the Clinton administration the second. Clinton and Gore were expressing clear endorsement of the IPCC recommendations.[233] The problem was that they were held hostage by the US Senate that made it clear before Kyoto that they would not agree to binding greenhouse gas (GHG) reductions and subsequently did not ratify the Kyoto protocol (Harrison 2000). Therefore, the reluctant approach shown in Kyoto and the insistence on flexible mechanisms by the US delegation in The Hague reflects the fact that the US representatives (the official delegation, but also some environmentalists) think it is in the best interest of their country to use flexible mechanisms because they are cheaper and impose a lighter burden upon the US economy. They fear that a more rigorous approach would meet stiff domestic resistance. The leader of the US delegation in The Hague, Loy, put it this way: 'Nations can only negotiate abroad what they believe they can ratify at home' (*The Washington Post* 26 November 2000). This raises the question of why the US (at least from a European perspective)[234] was and still is less prepared to commit itself to stringent goals compared to the EU (Grubb 1999; Harrison 2000).

An obvious answer to this is the fact that US citizens have become accustomed to a lifestyle much more energy intensive compared to the rest of the world. Given the contemporary technostructure (fossil-fuel intense), this translates into higher levels of fuel consumption. In fact, per capita emissions of carbon dioxide are among the highest in the US—they are almost five times the global average (only Luxembourg and three small oil-producing countries exceed US per capita carbon emissions).

It would therefore require regulatory efforts on the part of the US government in order to increase energy efficiency. Such measures would probably include taxation which is not going to be very popular. This then raises the next question: why has the build up of public attention in the US been slow and weak? Here I will argue that in contrast to the ozone case, the advocates for regulation did not achieve what they aimed at.

The role of public attention

In order to do so, I shall focus on the work of the IPCC and its effects on the policy process. The argument will be made that the architects of the IPCC may have drawn the wrong lessons from the ozone case. My starting point is a statement from the late Austrian diplomat and negotiator during the talks for the Montreal Protocol, Winfried Lang. He described the confrontation during these negotiations between the (then progressive) US delegation and the (then reluctant) European Community in the following way:

> During the negotiations on the ozone layer it was the US-delegation, which by means of continuous contacts with the media tried to build up a climate of public expectations which should induce still reluctant delegations (mainly those with EC-membership) to agree to substantial reductions of emissions. Further research will tell us, whether the relatively flexible stance finally adopted by the European Community was brought about by this manipulation of public opinion from the outside or rather by an internal process of rethinking threats and options. (Lang 1994: 175).

The roles have been reversed but we are watching the same play, aren't we? Not exactly, since the EC, for a long time, did not take a leadership role and did not do very much to build up a climate of public expecta-

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231 Ott (2001) has argued that the complexity of the issues on the negotiating table and a lack of leadership were to blame primarily for the breakdown in The Hague.

232 Eileen Claussen, president of the Pew Center on Global Climate Change said: 'In the long-term fight against global warming, we need every tool at our disposal… If we take carbon sequestration and market mechanisms out of the equation, or bog them down with such overly restrictive rules that nobody uses them, then we are limiting our ability to meet our environmental objectives.' (*New York Times*, 26 November 2000).

233 In his address on July 3, 1997 to the United Nations General Assembly Special Session, President Clinton noted that 'the science is clear and compelling' and wanted the United States to take a strong leadership role on climate change. In the autumn of 1997, Clinton's administration also instigated a campaign to build public support for the Kyoto treaty (Krosnick et al. 2000).

234 Americans rightly point out that there is something hypocritical about the EU's position. The UK and Germany were the only two countries that made significant progress in reducing CO_2 emissions. This was largely the product of fortuitous circumstances (the shut down of mining in the UK and the breakdown of the East German economy after unification in 1990).

tion. The expectations raised by the media in the ozone case have in fact been much higher in the US than in the EC countries. Taking the example of the German press, in the weeks before the Montreal Protocol was passed there were only two reports on the topic in the German press, compared to eight articles in the *New York Times* alone (Grundmann 2001). Let us see if this correlation between a country's active policy and high expectations in the relevant public sphere[235] also applies to the climate conferences.

Conducting an online database research in Lexis®-Nexis® Executive, I compared media attention about climate change in selected countries (see Table 1 for an overview). I limited the search to German, UK and US media attention.[236] The search was performed for the periods leading up to and including major international negotiations: Berlin, 7 March-8 April 1995; Kyoto, 15 November-15 December 1997; The Hague, 1-30 November 2000; Bonn, 1-31 July 2001. [237]

Comparing absolute numbers of media reports in these three countries, US news reports score very high, especially around the Kyoto meeting (see table 1-1). However, the numbers of newspapers included in Lexis-Nexis vary across countries. Compared to German sources, US sources are represented at a much higher proportion (by a factor of 20). In order to avoid this imbalance, I calculated the relative values, dividing absolute numbers of news reports by the number of news outlets. Relative data reveal the paramount attention paid by Germany news outlets compared to both the UK and US. However, even this 'correction' of data has to be treated with caution. The Lexis-Nexis database seems to change over time, so it might not be internally consistent (see the Italian and Spanish data in Table 1-1). Apart from this, it is not clear how frequently the less important papers have reported on the issue. In order to avoid this problem, I reduced the number of press outlets to just one quality broad sheet in each country. Again it appears that the German media rates climate change more newsworthy than the other two countries. Taken together, there were 158 reports in the *FAZ*, 118 in the *FT,* and 83 in the *NYT*. German attention at the Berlin 1995 and Bonn 2001 conferences was far higher compared to the US and UK. Germany hosted these two international climate conferences and is also the home country to the UNFCCC secretariat (neither did the US nor the UK host an international climate conference during this period). Only in the case of the Kyoto and The Hague negotiations did *FAZ*, *FT* and *NYT* report on comparable levels.

If we look specifically at the reporting on these climate summits, and go back to total aggregated data, it emerges again that, apart from Kyoto, German attention was highest throughout. In contrast, US attention was low at the time of the Berlin conference, then rose for Kyoto, only to fall off for The Hague and Bonn. If we look at the establishment press, the *FAZ* dwarfs both *FT* and *NYT*—the *NYT* did not pay any attention to Bonn (for reasons of consistency I stuck to the search term "climate conference". The *NYT* did publish eight articles on Bonn, using the term "climate treaty", see table 1-8).

Apart from the difference in media attention, there is a difference in lobbying activities. In the ozone case, advocates of strict regulations operating out of the US, developed an aggressive campaign at the international level via the network of US ambassadors. US scientists were sent to other countries in order to convince them that there was a scientific case for regulations. US environmental groups, in particular the NRDC, initiated activities in Europe and Japan corresponding to those of the local environmental groups, which had to this point remained largely passive. In Great Britain this was seen as interference in British internal affairs. As Richard Benedick observed: 'Not until early 1987 did the efforts of some US environmentalists in the United Kingdom begin to pay off in the form of television interviews, press articles, and parliamentary questions about the government's negative policy. Indeed, these US private citizens were so successful that Her Majesty's Government in April 1987 asked the US Department of State to restrain their activities.' (Benedick 1991: 39).

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235 There is a difference between public opinion (as measured, e.g., through polls) and media attention (Gamson and Modigliani 1989). I chose to use the latter as an indicator of the agenda setting activities related to the policy process (cf. Baumgartner and Jones 1993; Mazur 1998; The Social Learning Group 2001). One reason for doing so is that elites listen more carefully to the published opinion as compared to the public opinion (they cannot ignore unpleasant news as easily as they can poll data). What is more, in most cases, media selection of issues predates public preoccupation. As eminent sociologist Luhmann noted, 'everything we know about our society, about the world we live in, we know from the mass media' (Luhmann 1996: 9). Mazur (1998: 459) asserts that 'public worry and government action rise and fall with the quantity of news coverage'.

236 Including all European languages would have made the search too cumbersome. Instead, I focused attention on those countries which were allegedly taking a lead on climate change in Europe.

237 Due to a lack of German data for the year 1992 I did not include the Earth Summit in Rio. Lexis®-Nexis® Executive only provides data for the *Süddeutsche Zeitung*.

	Berlin 1995	Kyoto 1997	The Hague 2000	Bonn 2001
(1) European and US news reports on climate (major stories only). Search terms: "clima!" / "klima!".				
Dutch News	3	111	185	121
German News	297	259	539	727
Italian News	0	27	5	70
Spanish News	0	1	0	212
French News	108	154	334	264
UK News	114	277	279	167
Total European	522	829	1342	1561
US News	160	1640	427	562
(2) Relative values, selected countries only. Ratio of above data under (1) compared to number of news sources (28 German sources, 235 UK sources, and 438 US sources).				
German News	10.61	9.25	19.25	25.96
UK News	0.49	1.18	1.19	0.71
US News	0.37	3.74	0.97	1.28
(3) News reports (major stories only) on "greenhouse" in UK News, US News, German News. Search terms: "greenhouse!" /"Treibhaus!".				
German News	73	163	196	173
UK News	58	182	140	99
US News	70	727	219	190
(4) Relative values. Ratio of above data (3) compared to number of news sources (28 German sources, 235 UK sources, and 438 US sources).				
German News	2.61	5.82	7.00	6.18
UK News	0.25	0.77	0.60	0.42
US News	0.16	1.66	0.50	0.43
(5) Establishment press on Climate Change. Search terms for NYT and FT: "greenhouse!" and place. Search term for FAZ: "Treibhaus!".				
FAZ	39	50	22	47
FT	20	55	24	19
NYT	3	53	18	9
(6) News reports (major stories only) on climate conferences in UK News, US News, German News. Search terms: "climate conference"/ "Klimakonferenz".				
German News	102	89	196	62
UK News	25	23	38	6
US News	45	110	84	38
(7) Establishment press on Climate Conferences. Search terms: "climate conference"/"Klimakonferenz".				
FAZ	31	41	13	33
FT	6	3	3	0
NYT	1	5	2	0
(8) Establishment press on Climate Conferences. Search terms: "climate treaty"/ "Klimakonferenz".				
FAZ	31	41	13	33
FT	0	1	0	2
NYT	0	8	8	8

All searches were limited to the following places and periods: Berlin, 7 March - 8 April 1995; Kyoto, 15 Nov-15 Dec 1997; The Hague, 1-30 Nov 2000; Bonn, 1-31 July 2001.

Table 1: Media reports, Source: Lexis®-Nexis® Executive [http://web.lexis-nexis.com/executive/], accessed 3 September 2001

Nothing comparable has happened in the climate case.[238] The embassies seem to have kept quiet, there was no need felt to send scientists around the globe since the IPCC arguably was set up as a world-wide operation to achieve exactly this task. For historical reasons, it is obvious that Europe is ill prepared to take on a missionary role vis-à-vis the United States but has been used to accept the reverse. Moreover, there is a lack of European co-ordination during the negotiations. Whereas the US represents a coherent position in negotiations with the EU, the latter demonstrates the 'unwieldy (and introspective) morass of EU decision making' (Grubb 1999:112). Last but not least, environmentalists thought that they were aiming for the same goals across the globe. Too much seemed to be taken for granted. The EC may have trusted the IPCC to do the job of getting everyone to agree to controls and therefore did not try to influence US policy from the outside. While the split in the ranks of the environmentalists is a recent (and maybe temporary) phenomenon and anyhow lies beyond the scope of this article, I shall focus on the role of the IPCC and show how the forging of a consensus among scientists was counterproductive.

Consensus as priority

By institutionalising international scientific assessments, the architects of the IPCC drew what they think to be an essential lesson from the case of the ozone layer controversy.[239] They tried to arrive at a consensus view on the scientific aspects of global climate changes, thus forming an 'epistemic community' (Haas 1992).[240]

Apart from other leading scientists such as John Houghton and Bert Bolin, Robert Watson played a key role in this process. In the beginning of the 1980s he perceived that CFC regulations would be hampered by the existence of many differing ozone assessments. At the time there were six different reports on the state of knowledge on ozone. Operating under the assumption that scientific uncertainty would make regulations more difficult, this could only lead to confusion and, above all, it gave the opponents of regulations welcome arguments. These reports were commissioned by the European Community, NASA, NAS, UNEP, WMO, and the British government. As Watson told me,

> At that stage industry and other people were looking rather at the differences than at the commonalities of the different studies. So I tried to work with the international science community toward a single international assessment (Author interview with Robert Watson, 21 November 1994).

Watson successfully led the international scientific community to write one single report. The first report was published in 1986 with several other reports following in 1988, 1989, 1991, and 1994. This reporting system provided a mechanism that allowed bringing together all relevant scientists and making them agree on a common position. While it is clear that these reports were used as scientific legitimisation for CFC controls, it is less from clear that they were the driving force. There is evidence that rising public concern created by a transnational network including advocacy scientists was much more important (Grundmann 2001).

The IPCC was founded in November 1988, sailing in the waves of enthusiasm created by the successful Montreal Protocol, by two UN bodies, UNEP and WMO. Its role is to review and assess the published scientific literature on climate change, its costs, impacts, and possible policy responses. It also plays a role in assessing scientific and technical issues for the UN Framework Convention on Climate Change (Shackley 1997). Therefore, the IPCC is modelled precisely after the WMO-UNEP assessment reports in the ozone case. In both cases, a standardisation and orchestration (Elzinga 1995) of scientific knowledge is seen as instrumental to get the right policy decisions. This follows a linear or 'technocratic' policy model according to which a scientific consensus can be transformed into political decisions.[241]

It has been remarked that insofar scientists adhere to this view, they must be regarded as rather naïve (Shackley and Skodvin 1995). Others have argued that the IPCC has primarily served the self-interest of the participating scientists in that they attracted huge funding resources and therefore stayed away from

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238 This could be one of the reasons why media attention on climate change stalled in the early 1990s. Mazur (1998) speculates about the reasons for this drop in media attention without mentioning this possibility.

239 As has been shown above, climate change assessments were already carried out since 1979. However, they have been largely confined to the US. It was only after the international conference in Villach (1985) that an international assessment process was established.

240 Haas (1992:187-8) defines an epistemic community as 'a knowledge-based network of specialists who share beliefs in cause-and-effect relations, validity tests, and underlying principled values and pursue common policy goals.'

241 Although government representatives nominate scientists to be represented in the IPCC and negotiate the wording of the executive summaries of the reports, this does not contradict the claim that IPCC follows a linear or technocratic model of policy consultancy. The fact that government representatives nominated the scientists they nominated suggests that they themselves intended to make global climate change into a political issue (O'Riordan et al. 1998: 369). This 'orchestration of consensus' did not, however, extend to those powerful stakeholders and parts of the American public who were hostile to climate change regulations.

advocating specific policies (Boehmer-Christiansen 1995). To this, it has been replied that the avoidance of policy advocacy in IPCC reports is rooted in a desire to make the scientific information as effective as possible: 'For scientific information to be believed by the majority of participants in policy debates, it must be even-handed and not favour particular political or economic interests' (Moss 1995). Without doubt, the IPCC has succeeded in establishing a shared understanding of climate change that is accepted by many participants involved in building the climate change convention, although some powerful stakeholders seem unimpressed. But why has it been so difficult to implement the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol?

The case of ozone layer protection was different in that there was, before the consensus assessment reports, strictly speaking, no epistemic community. From the beginning, a few advocacy scientists (like F. Sherwood Rowland, Mario Molina and, later, Paul Crutzen) dared to combine their scientific judgements with political recommendations or demands. Rowland was not afraid to demand first a ban on CFCs in spray cans and then, after the discovery of the ozone hole in 1985/86, a general ban. Moreover, it was he who coined the metaphor of the ozone hole. His credibility and that of other advocates grew as time passed, particularly after the onset of dramatic events in 1985 (the ozone hole). In the 1970s and the beginning of the 1980s, Rowland was considered an extremist by many colleagues (Roan 1989). In the case of climate change the role to be played by advocacy scientists was curbed by the deliberate creation of an epistemic community. To be sure, back in the 1980s, climate researchers Stephen Schneider and James Hansen distinguished themselves as advocates of a policy of prevention. At public hearings, they did not hesitate to describe current extreme climatic events as expressions of anthropogenic climate change (most famously by James Hansen in the heat wave of 1988)—for which they were much criticised (cf. Nance 1991). With the IPCC, this activity largely subsided.[242] Climatologists thereby gained an exciting, relatively well-funded international research field, but at a price: they did not move beyond the boundaries of the official consensus. This gave sceptics and outsiders the opportunity to question the available findings, which they did in public, primarily in the mass media (see Gelbspan 1997). So in the end, all attempts at reaching a consensus view notwithstanding, debate and controversy could not be avoided. As a result, in this game, the IPCC advocates of strong reduction goals ironically were disadvantaged since fierce enemies of regulation seemed to dominate the public debate where they were not attacked by equally adamant advocates of regulation but by a consensus view that expresses the least common denominator.[243]

There is an argument about the difference in both cases that pertains to the salience of the threat posed by the two cases. Ungar (2000) holds that the ozone case represents a 'hot crisis' which is perceived by the public to have direct effects on their lives, while in the case of climate change we only have long-term, abstract threats. However, as the preceding paragraph has shown, there have been several attempts to link extreme weather events to long-term climate change. It may be the case that after Hansen's 1988 statement and the formation of the IPCC, 'reputable scientists routinely claim that any extreme … weather season cannot be attributed to climate change. Whether intentional or not, this dissociation effect has been abetted by the media.' (Ungar 2000: 308). In a different study on the US media, Ungar (1999) found no correlation between coverage of extreme weather events and stories on climate change. The picture in Europe is clearly different. In Germany, for example, the term climatic catastrophe is current in the mass media (Weingart et al. 2000:269), and UK papers routinely link extreme weather events to climatic change. Incidentally, the flooding of large parts of England at the time when negotiators gathered in The Hague was very much used by the media to foster expectations for a successful outcome of the meeting. So there seems to be a difference between the US and parts of Europe (mainly Germany) regarding the public's perception of climate change as a 'hot crisis'.

The upshot of the argument so far is that it is not

[242] What is more, Hansen (Hansen et al. 2000) recently has expressed some doubts: 'Dr. Hansen is considered the father of the theory of Man-made global warming due to his alarming testimony in 1988 before a United States Senate committee. Demonstrating a willingness to follow the evidence irrespective of where it may lead, he recently downplayed the conventional wisdom, which he helped spawn, that CO_2 was the predominant "greenhouse gas".' (*United Press International*, 20 November 2000).

[243] Just one example of how 'orchestration of consensus' works in practice. Late in 1999 when draft reports of the Third Assessment Report from Working Group II had leaked to the press, the co-chairs of Working Group III gave the following advice to lead authors for dealing with press inquiries about the draft WGIII report: 'the appropriate response is "no comment." Material in the draft report is embargoed from release to the press… For any author to comment to the press at this time beyond saying "no comment," could harm our credibility as objective assessors of scientific evidence. Until the review process is complete, any public comment on the content of the report or on press coverage of our activities can be interpreted as personal bias, and could be used by those who are looking for evidence to discredit our endeavors.' (Rob Swart, email to lead authors, 3 December 1999).

world-wide scientific consensus (or the lack of it), which explains the slow progress of the climate change policy but the (lack of) media attention in the US. From the argument put forward here it follows that the key variable in explaining the failure to agree to binding targets is the 'cool' US public (cf. Grubb 1999)[244] and the absence of advocates of a strong treaty who try to change this from outside. If there had been public concern about climate change in the US, the US delegation would have taken this into account at the negotiating table. To counterbalance public indifference to global climate change, a public discussion about all aspects would have been required. Recall the analysis provided by Lang according to which during the ozone negotiations 'it was the US delegation, which by means of continuous contacts with the media tried to build up a climate of public expectations which should induce still reluctant delegations … to agree to substantial reductions of emissions.' (Lang 1994: 175). The consensus-driven IPCC has inhibited this, precisely because it was so successful at consensus building. The fact that everyone in The Hague agreed to the science did not mean that negotiating a treaty would be easier.

The case of climate change reveals the limits of the technocratic policy model, since reaching a common scientific judgement does not necessarily mean that the problem can be defined and solved in concert. Problem definition is a much broader concept than scientific description of a problem; the former contains essential elements of a pragmatic, practical, and political dimension, which the latter, as a rule, forgoes. Yet what is more, as we know from other examples, scientific knowledge (or the absence of it under conditions of uncertainty) has no direct bearing on policy outcomes. Ozone is an example where prudent political action was taken under uncertainty. In the 1970s, CFC regulations were taken on the basis of (disputed) model calculations. At the time of signature of the Montreal Protocol, no commonly accepted scientific explanation of the ozone hole was available. Conversely, in many cases no political action follows from conclusive scientific knowledge or consensus expert opinion because economic and political factors are much more influential. Policy makers make use of expert recommendations as they see fit. Are scientists deceiving themselves? They may, understandably, feel flattered by the role assigned to them and many environmentalists may think that the IPCC is essentially a 'good' thing. However, as some powerful players around the globe could not influence the composition of this expert body they sponsored contrarian scientists. In the end, even provided that well-meaning politicians were intending to bind themselves to the findings and recommendations of IPCC (which seems plausible if we follow Elzinga's analysis in terms of an 'orchestration of consensus'), the consensus was not all pervasive. It took only a few but powerful stakeholders to dominate US public opinion.[245] In sum, scientific consensus can hardly be seen as the driving force in the process of adopting environmental regulations. These will be the product of a political process in which the public (via the agenda setting function of the mass media) has much greater weight. The contrarians seem to have understood this much better than the architects of the IPCC.[246]

Conclusion: Ozone simple, climate complex?

It would be foolish to downplay the differences of both cases. Both developed in historical time which is to say that many factors have changed since the signing of the Montreal Protocol, including the (lower) salience of environmental issues on the political agenda, the (self-) understanding of science and its accomplishments both among the public and the political system. However, both cases are path dependent and change our expectations as we move along in time. The fact that CFCs were the first class of industrially produced chemicals to be banned was unthinkable in the 1970s and 80s but now we seem to

[244] As indicated earlier, by public I mean mass media. However, there seems to be support for my argument also from poll data. Gallup's March 5-7, 2001 poll asked respondents to characterize the amount they worry about 13 different environmental issues as either 'a great deal,' 'a fair amount,' 'only a little' or 'not at all.' Only 33% of Americans told Gallup they personally worry about the 'greenhouse effect' or global warming a great deal. However, public concern over climate change has been waxing and waning over the years. The figures for previous years were: 35% in 1991, 24% in 1997, 28% in 1999 and 40% in 2000 (www.gallup.com/poll/releases/pr010409.asp).

[245] The *Seattle Weekly* (9 July 1997) described the process as follows: 'The Western Fuels Association's paeans to pollution, combined with strong-arm lobbying by oil industry groups such as the Global Climate Coalition and pseudo-scientific policy papers by conservative think tanks like the Marshall Institute, helped the administration derail international climate-change negotiations at the 1992 Earth Summit in Rio de Janeiro, Brazil. In the ensuing five years, under relentless fuel-industry pressure, negotiations have failed to produce any solid international commitments to fossil fuel reductions despite the increasingly grave warnings from the scientific community.'

[246] An other example is the 'chapter 8 controversy' where contrarians accused two leading IPCC scientists, Ben Santer and Tom Wigley, to have altered parts of the IPCC's Second Assessment Report in order to make it sound more dramatic (Seitz 1996; Singer 1996). The fact that they could do so, no matter how unjustified their allegations were (cf. Edwards and Schneider 2001; Santer at al. 1996) vindicates the fragility of the IPCC construction. For the contrarians it was sufficient to publicly cast doubt on the integrity of the IPCC. Since the public is less interested in the technical details of scientific debates the contrarians scored points ('mud always sticks').

take it for granted. Therefore, the measures of success and failure may also shift in historical time. IPCC scientists concentrated their main activity on scientific scenarios which are supposed to prove beyond reasonable doubt that climate change is real, human made, happening now, and problematic. They have been largely successful in doing so, but did not convince some powerful stakeholders who block ambitious GHG reductions. At the same time, the IPCC could not quite keep up with the speed of the political process which—due to the influence of these powerful stakeholders—had moved in the direction of exploring a range of 'flexible measures'. The difficulty to develop reliable and agreed-upon indicators (and monitoring instruments) has led to a deadlock in The Hague which, for the time being, was resolved in Bonn. It is open to speculations how this issue will be resolved in future negotiations.

Popular explanations for the difference between the two cases either cite the greater size or complexity of the problem of climate change, or how 'simple' it was to solve the problem of the ozone layer. In retrospect it may seem so, in accordance with a functionalist logic that declares solved problems to be easily solved problems. Upon closer examination, the ozone case was anything but simple. For almost twenty years, producers of CFCs throughout the world resisted regulation, in part by means of the same arguments which are still heard in the case of climate: there were, they claimed, no cost-effective alternative technologies. Such technologies came onto the market after the producers were forced to forgo the use of CFCs. The anti-regulation position was still so strong in 1987 that six months before the signing of the Montreal Protocol, Lang, then chair of the international ozone negotiations, claimed that no more than 10 to 20% CFC reduction was feasible in the next decade (*New York Times*, 28 February 1987).[247]

It is sometimes also argued that the greater objective importance of greenhouse gases for the world economy makes it more difficult to curb them (compared to the relative small importance of CFCs). The decarbonisation of the world economy will amount to a radical restructuring of its technical infrastructure. However, from the fact that GHGs are more central to the economy it does not *immediately* follow that it is more difficult to reduce them. This is a matter of technical alternatives, political instruments, economic incentives, and public support (Hawken, Lovins and Lovins 1999; de Leo et al. 2001). To be sure, the more central a technology is, the more one should expect powerful actors to defend it. This is the case since the number of potential veto players is likely to increase. But there is a reverse side, too: as more technical and business opportunities arise, more new players will enter the game. Only if it could be shown that it is nearly impossible to power the carbon-based economy with alternative energy sources would the argument of 'objective importance' be convincing.

It is striking how often the argument of the greater size and complexity of the problem is advanced—but it applies mainly to the reluctant US policy, not across the board. Such attempts seem to forget that Europe is making good progress in substituting fossil fuels with renewable energy sources. This means that the size-and-complexity argument does not hold. We are led back to the major question, Why has the US been so reluctant in taking climate protection seriously?

There is some truth to the complexity thesis with regard to the structure of business in both fields. While Du Pont was the market leader, and its change of direction set off a chain reaction, this has not occurred in the climate case and it is doubtful if it can. Here, there is no dominant producer from whom all others take their cue. However, European oil companies such as BP and Shell have given up their obstructive role. For example, in May 1997, John Browne of BP announced that the company was in favour of gradual reductions in carbon dioxide emissions: 'The time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven, but when the possibility cannot be discounted and is taken seriously by the society of which we are part. We in BP have reached that point' (Browne 1997: 55). BP's declaration could in any case be seen as a sign that oil producers no longer see their future exclusively in terms of oil and thus trigger a bandwagon effect.

But the real important difference between the two cases is as follows. A strong, publicly visible, transnational policy network that alarmed the world public and advocated strict controls decided the ozone controversy. The advocates of regulation owned public credibility, the scarcest resource in such controversies. In the climate controversy, however, there were no vociferous advocacy scientists acting all the way through the debate. What is more, one of the early advocates seems to have mellowed down. In a way, the early institutionalisation of the epistemic community in the form of the IPCC suppressed any open controversy, including the creation of a 'climate of expectation' across territorial borders. In order to

[247] It should be recalled that at the time, the idea of banning an entire class of industrially produced chemicals by means of international measures was completely outlandish. I am grateful to Konrad von Moltke for this suggestion.

preserve a consensus (of which too much was expected politically), the scientific controversy was silenced. This gave outsiders the chance to make their name in media and effectively cast doubt on the consensus, albeit being condemned as essentially unscientific by the IPCC. If all conflicting opinions would have been openly aired, then the advocates' justification could have made their case for a serious commitment much better—assuming that their credibility had increased over the years.

The construction of the IPCC as an international epistemic community committed to a scientific consensus has proven, on this view, to be somewhat counterproductive. The drive to establish a scientific consensus robbed the controversy of an essential dynamic. The gain in public credibility of those advocating for climate protection, above all in the US, has not been sufficiently achieved in the climate debate. However, this would have been the essential requirement to influence the US position at international talks. This is a speculative lesson which follows from the above analysis. If plausible, it would put into question the main lesson drawn by the architects of the IPCC.

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