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# Acid Lessons? Assessing and Explaining LRTAP Implementation and Effectiveness

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# Working Paper

**Acid Lessons?  
Assessing and Explaining LRTAP  
Implementation and Effectiveness**

*Jørgen Wettestad*

WP-96-18  
March 1996



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## Preface

Addressing the issue of domestic implementation of international environmental commitments, the LRTAP regime (i.e. Convention on Long Range Transboundary Air Pollution) is in several ways an interesting regime for the IIASA-based IEC project. IIASA has provided important inputs to the development of the "critical loads" approach within this regime. Moreover, compared to other international environmental regimes, the LRTAP regime is amongst those given most research attention so far. This reflects LRTAP's comparatively long history, the development of several "sub-regimes", and at least theoretical possibilities of conducting comparative analyses over time. Moreover, as already indicated, another aspect is the latter years' exciting "critical loads" development and close relationship between science and politics. A natural question to ask is: what kind of lessons can be formulated on the background of this literature so far?

As the work on the present report has progressed, it has become increasingly clear that even if the pile of relevant implementation literature on the four selected countries (the UK, the Netherlands, Germany and Norway) is less voluminous than might have been expected, it is undeniably still a pretty tall order. Hence, it is necessary to emphasize the provisional character of the results presented in this report. Especially the discussions of the complex and important "domestic politics" aspects are rudimentary, both analytically and empirically.

I have received general support and very useful comments in several rounds from the other members of the FNI IIASA team, Steinar Andresen, Torunn Laugen, Jon Birger Skjærseth and Olav Schram Stokke, and from IEC project co-leader David Victor. Other members of the IEC project group and Advisory Committee have provided valuable comments at project meetings.

I also thank two projects that shared drafts of case studies: the EU-funded project on preparation, negotiation and implementation processes within the European acid rain context (i.e. LRTAP and the EU), led by Kenneth Hanf and Arild Underdal; and the project on Social Learning in the Management of Global Environmental Risks.

Lars Nordberg at the LRTAP Secretariat provided me with useful information on many aspects of the LRTAP regime during a visit to the Secretariat in May 1995. Per M. Bakken, Harald Dovland and Mari Sæther at the Norwegian Ministry of Environment also provided very valuable LRTAP information during some "sessions" in the fall of 1995.

I would also like to thank Ann Skarstad, FNI, for language assistance.

Finally, I am of course solely responsible for the remaining and obvious shortcomings of this report.

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# Acid lessons? Assessing and Explaining LRTAP Implementation and Effectiveness

## 1. Introduction. LRTAP: Why? How? What?

Although much remains to be done, *some* work on the effectiveness and implementation of international environmental regimes has already been carried out. The LRTAP regime (i.e. Convention on Long Range Transboundary Air Pollution) is one of the regimes which has been given most research attention so far. This is due to reasons such as its comparatively long history, with the development of several "sub-regimes", and at least theoretical possibilities of conducting comparative analyses over time. Moreover, another aspect is the latter years' exciting "critical loads" development and close science-politics relationship. On the background of factors like the aforementioned, there is also LRTAP's role as a very interesting model for the development of other environmental regimes, such as the climate change regime. At this stage, therefore a natural question to ask, is: what kind of lessons can thus far be formulated on the background of this literature? At least two types of lessons, and hence purposes of this report, can be indicated.

First, policy-makers (and I suppose many researchers too) would probably welcome relatively short summaries of the main knowledge on LRTAP international and national processes related to implementation and effectiveness. Hence, one important aspect of this work is to try to *put together a condensed picture for other researchers, and not least for policy-makers* - not to replace, but to facilitate and encourage further reading of the various existing contributions.

Second, interesting (but tricky) questions (primarily) for researchers are questions related to the *"status" of the knowledge produced so far*. In other words: are research perspectives and findings so far conflictual or complementary? If conflictual, why? How "solid" is current knowledge with regard to different areas of LRTAP activity ("solidity" having something to do with several independent research projects reaching similar conclusions)? What are the main areas where existing knowledge is thin or lacking? As these questions are generally very tricky, this report only makes a modest, first effort to pin down some important areas where existing knowledge is in dispute, or is lacking.

Hence, it should be noted that more weight is given to the former than the latter purpose, much due to the complexity of this "knowledge assessment" task.



Another delimitation of the focus is to stress that the main focus is the LRTAP regime. As will be shown later, policy-making within the European Community (EC) and LRTAP is closely intertwined, both internationally and nationally. Although important EC processes are commented upon, they are not given the attention they "deserved" - if the purpose had been to sum up and assess knowledge on air pollution implementation in selected countries more generally.

Hence, on this background, let us specify the focus in this report. Here is my suggested list of the "ten most frequently asked questions about LRTAP" to which I will provide tentative answers. Most of the concepts and issues touched upon in my background comments to the questions will be further clarified later.

### *IS LRTAP A "HIGH-COMPLIANCE REGIME?"*

I will revert to the interesting and complex relationship between compliance, implementation and effectiveness later, but the main thing to note here is whether states have reportedly followed up what they have promised to do internationally. The international conferences and general, policy fights between actors like the US and the EC often get a lot of international attention, but what happens afterwards is often ignored. *Have* emissions actually been cut?

### *HAVE THE ACID RAIN PROBLEMS ADDRESSED BY LRTAP BEEN SOLVED SO FAR? WOULD THE PROBLEMS HAVE BEEN WORSE WITHOUT THE LRTAP REGIME?*

These are more or less the "effectiveness" questions. Here, the main thing to note is that although the answer to the previous compliance question may well turn out to be positive, problem solving may still be far away. Emission reductions goals set in the celebrated agreement may be very modest, so that fulfilling them faithfully may mean only modest environmental improvements. A more grave possibility may be that critical limits in the environment have been exceeded, so that emission reductions come too late to ensure fish or tree survival.

However, low problem-solving may also be due to lags in environmental recovery processes and natural variations in the environment counteracting emissions reductions. Hence, low problem solving is not necessarily related to a behaviorally ineffective regime.

### *ARE THE MAJOR CAUSAL FACTORS FOR COMPLIANCE LEVELS FOUND WITHIN THE SPHERE OF ENVIRONMENTAL POLITICS?*

The background for this question is of course that the level of a country's polluting emissions is influenced by a range of societal factors, and many of them having nothing to do with "environmental politics" in a strict sense. For instance, a country's own polluting emissions may decline due to industrial recession and production reductions, increases in energy prices leading to increased energy efficiency or development of nuclear options - to mention some

possibilities. Such reductions cannot be counted either as international or national environmental policy successes.

#### *CAN "NATIONAL INTERESTS" ROUGHLY PREDICT LEVELS OF COMPLIANCE?*

Both scientists and policy-makers seek simple and parsimonious time-saving information, and the question here is whether there is an approximate correspondence between the rough national cost-benefit picture and the levels of compliance achieved. Research so far has indicated that the unitary rational actor and the "national interests" perspective has been a powerful analytical tool when predicting negotiating positions. But is it equally powerful in throwing light on the complex implementation processes?

The background for this perspective and the one below is further discussed in section 4.1.

#### *WHAT ASPECTS OF DOMESTIC POLITICS MATTER MOST?*

"Domestic politics" can of course be classified and typologized in a number of ways. My suggested rough analytical scheme (somewhat inductively developed) distinguishes between five main categories of factors: first, regulatory philosophies ("general"/more long-term and "specific"/short-term/issue-related); second, intra-governmental/inter-ministerial power balance - e.g. how powerful is the Ministry of Environment?; third, the role of polluters/target groups - e.g. the degree to which they can be influenced by the government; fourth, the role of public opinion and "green" (NGO) forces; fifth, the "personal" factor - e.g. the "Thatcher factor". It should be noted that the important question of access and participation which is a special focus in this project is touched upon in all the three latter categories. An important, but again tricky, question is of course whether the "explanatory balance" is roughly similar in the selected countries - or whether this varies widely between the countries.

#### *WHAT ROLE HAS LRTAP PLAYED FOR NATIONAL "ACID REDUCTIONS", COMPARED TO OTHER INTERNATIONAL FACTORS AND "PURE" NATIONAL FACTORS?*

As stated earlier, the level and development of a country's polluting emissions are influenced by a range of societal factors, and in the cases, like acid rain, where these polluting emissions are also regulated by an international agreement/regime, it is of course interesting to try to assess the influence/"weight" of the international process in relation to the national policy processes. The classic question in this connection is: do regimes matter? With regard to "other international factors", in a European context, this is of course primarily the European Community/Union (hereafter, for the sake of simplicity, EC), which over time has developed substantial environmental policies on its own.

#### *ARE THERE CERTAIN FEATURES OF LRTAP INSTITUTIONAL DESIGN THAT HAVE BEEN MORE IMPORTANT THAN OTHERS?*

In comparison to the previous question, this question focuses solely on the international, regime level. Even if we found that the regime has strongly influenced national processes, not least for policy-making purposes, it is interesting to clarify which aspects of the regime have mattered most: effective decision-making rules? secretarial strength? confidence-building verification procedures? - to mention some interesting candidates.

*HOW HAVE THE MOST IMPORTANT INSTITUTIONAL FEATURES AFFECTED POLICY AND IMPLEMENTATION PROCESSES?*

This question goes even one step further in the "international" direction, and seeks to specify the *mechanisms* through which regime influence has been exerted. At least three main mechanisms may be indicated: 1) provision of *information/knowledge*; about the environmental problem, policy measures, other parties' implementation - among other things; 2) provision of *incentives*; financial, through funds etc.; economic/political, through linking of issues and opening up the possibilities for gains in other issue areas/future negotiations; 3) provision of *authority and capability*; e.g. the changes in the roles of flag, coastal, and port states under the new Law of the Sea. Knowledge about mechanisms may be interesting even if we find that total regime influence has been marginal. Such marginal regime influence may only mean that the mechanism has been over-shadowed by "malign" features of the environmental and policy problems at hand - e.g. polluting emissions stemming from core societal processes within the countries; features which may be less "malign" in other issue areas.

*ARE THERE MANY AREAS OF CONFLICTING ASSESSMENTS IN THE LITERATURE?* As indicated earlier, this question turns the attention away from the substantial content of the information available information so far, and the tentative lessons to be learned, towards a more general assessment of the status of this field of research. Do the various authors present widely varying assessments and analyses, and if so, why?

*WHAT ARE THE MAIN CHALLENGES FOR FURTHER RESEARCH?*

Within the analytical scheme sketched above, where is current knowledge thin or entirely lacking? In other words: do we yet have satisfactory answers to the most vital questions? What about the focused issues of "access and participation" in this connection?

Before delving further into the crucial concepts of compliance, implementation and effectiveness, and the actual compliance picture so far (section 3), let us roughly set the scene by summing up some important policy "landmarks" of the LRTAP process, and also provide a first overview of the main literature that the following "national" explanatory section (section 4) and "regime design" explanatory section (section 5) will build upon.

More specifically, the explanatory section will be split in two main parts. As it is far beyond my capacity to cover all the LRTAP countries even quite briefly, and a specific Russian LRTAP case study is underway within the project, in section 4, I pick four countries for closer assessment: the UK ("net pollution exporter"; important "laggard"); Germany (important emitter; gradually important "pusher"); the Netherlands (generally interesting with regard to international and national environmental politics); and Norway ("net pollution importer"; initial "pusher" getting into trouble..). In section 5, I turn the country-specific and "individualistic" perspective more or less around and adopt an international and "holistic" regime perspective. In other words, from being a member of the "explanatory choir", the regime moves centre stage. Given the case study information specifically focused here and other empirical material, what do we know about the importance of the various aspects of the LRTAP regime design? Basically, I distinguish between "structural" and "regulative" aspects of regimes. Six structural factors may be discerned: participation/access; the role of the agenda; decision-making rules; the role of the secretariat; the organization of the scientific-political complex; verification and compliance mechanisms. Regulative aspects may be discussed on the background of keywords such as ""legal status", "specificity" and "differentiation".

But first: some necessary background information.

## 2. LRTAP Background: Rough Overview of Policy "Landmarks" and Literature.

### 2.1. Policy "landmarks": development of the LRTAP regime.

In 1968 the Swedish scientist Svante Oden published a paper in which he argued that precipitation over Scandinavia was becoming increasingly acidic, thus inflicting damage on fish and lakes (Oden, 1968). Moreover, it was maintained that the acidic precipitation was to a large extent caused by sulphur compounds from British and Central European industrial emissions. This development aroused broader Scandinavian concern and diplomatic activity related to acid pollution, and played a part in the adoption of "Principle 21" at the 1972 Stockholm UN Conference on the Human Environment. This principle pointed out that states have an obligation to ensure that activities carried out in one country do not cause environmental damage in others, or to the global commons. The specific background for formal negotiations on an air pollution convention was the East-West detente process in the mid-70s, in which the environment was identified as one potential cooperation issue. Due to the East-West dimension, the United Nations Economic Commission for Europe (UNECE) was chosen as the institutional setting for the negotiations. ECE is one of five UN regional economic commissions concerned with information and generally facilitating collaboration, with a membership of 34 parties, including the US and Canada.<sup>1</sup>

The ECE Convention on "Long-range Transboundary Air Pollutants" (LRTAP) was signed by 33 Contracting Parties (32 countries and the EC Commission) in Geneva in November 1979. Four main aspects of the 1979 Convention may be discerned: a) the recognition that airborne pollutants were a major problem; b) the declaration that the Parties would "endeavor to limit and, as far as possible, gradually reduce and prevent air pollution, including long-range transboundary air pollution" (article 2); c) the commitment of Contracting Parties "by means of exchange of information, consultation, research and monitoring, develop without undue delay policies and strategies which should serve as a means of combating the discharge of air pollutants, taking into account efforts already made at the national and international levels" (article 3); and d) the intention to use "the best available technology which is economically feasible" to meet the objectives of the Convention.<sup>2</sup> The Convention did not specify any pollutants, but stated that measures should start with sulfur dioxide (SO<sub>2</sub>).

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1 For more information on these "formative" years, see for instance Park (1987) and McCormick (1989).

2 Nordberg, L. : "Combating air pollution", LRTAP "non-paper", March 1993.

The Convention has been in force since 1983 and has a current membership of 40 parties. Moreover, the Convention was to be overseen by an "Executive Body" (EB), which included representatives of all the Parties to the Convention as well as the EC. Furthermore, the ECE secretariat was given a coordinating function. The institutional structure has also included several Working Groups, Task Forces and "International Cooperative Programs". I will come back to this "scientific-political complex" in more detail in section 3.

After the signing of the Convention, the next step in the cooperation was the 1984 EMEP Protocol whose basic objective has been to allocate the costs of the monitoring program. As this report is concerned with implementation of policy regulations, this protocol will not be further commented upon in this context.

The first main *regulatory* step in the cooperation was the *1985 Protocol on the Reduction of Sulphur Emissions*. At the third meeting of the Executive Body of the Convention in Helsinki, July 1985, 21 countries and the EC signed this legally binding protocol. The Protocol stipulated a reduction of emissions/transboundary fluxes of sulfur dioxide (SO<sub>2</sub>) by at least 30% as soon as possible, and by 1993 at the latest, with 1980 levels as baseline. It came into force in September 1987. However, some major emitter states failed to join the agreement, the UK being the most important one.

In the *1988 Sofia Protocol on Nitrogen Oxides (NO<sub>x</sub>)*, the signatories pledged to freeze NO<sub>x</sub> emissions at the 1987 level from 1994 onwards and to negotiate subsequent reductions. Twenty five countries signed the protocol, including the UK and the United States. Moreover, 12 European signatories went a step further and signed an additional (and separate) joint declaration committing them to a 30% reduction of emissions by 1998.

The next step was the *1991 Geneva Protocol on Volatile Organic Compounds (VOCs)*. VOCs are a group of chemicals which are precursors of ground level ozone. The protocol calls for a reduction of 30% in VOC emissions between 1988 and 1999, based on 1988 levels - either at national levels or within specific "tropospheric ozone management areas". Some countries are allowed to opt for a freeze of 1988 emissions by 1999. 22 countries and the EC have signed the protocol.<sup>3</sup>

The latest step so far is the *new sulfur protocol*, signed in Oslo in June 1994 by 26 Parties, and based on the "*critical loads*" approach. The aim of this approach is that emissions

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3 For more information on the protocols, see for instance McCormick (1989) and Sand (1990).

reductions should be negotiated on the basis of the (varying) effects of air pollutants, rather than by choosing an equal percentage reduction target for all countries involved.<sup>4</sup>

Negotiations are currently underway on a new protocol integrating new NO<sub>x</sub> and VOC requirements.

## 2.2. Rough overview of existing LRTAP policy-oriented literature.

Let us first turn to the major effectiveness and implementation *projects*. To my knowledge, both the Tubingen regime project<sup>5</sup>; the Oslo/Seattle effectiveness project<sup>6</sup>; the Dartmouth/Harvard effectiveness project<sup>7</sup>; the Clark project on social learning<sup>8</sup>; and the Hanf/Underdal project on implementation<sup>9</sup> all include the LRTAP regime among their case studies. Only the Hanf/Underdal project focuses solely on LRTAP (countries).

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- 4 For an analysis of the 1994 sulfur protocol, see Churchill, Kutting and Warren (forthcoming).
  - 5 See e.g. Rittberger (ed.) 1990; 1993. The main bulk of this work has been focused on the question of regime formation, and the usefulness of different problem and issue typologies for predicting and explaining regime formation.
  - 6 Around 1987/88, the "Oslo/Seattle" effectiveness project was started, with Ed Miles and Kai Lee in Seattle, and, on the Oslo side, Arild Underdal, Steinar Andresen, Jon B. Skjærseth and the author of this paper as main participants. Empirically, the Oslo team has focused on seven regimes: the ECE LRTAP Acid Rain Convention; the Paris Landbased Marine Pollution Convention (PARCOM); the Barcelona Mediterranean Pollution Convention; the Vienna Ozone-layer Convention; the Oslo Marine Dumping Convention (OSCOM); the International Whaling Convention (ICRW); and the Antarctic Marine Living Resources Convention (CCAMLR).
  - 7 In 1991, the "Dartmouth/Harvard" effectiveness project was established, with Oran Young at Dartmouth and Marc Levy at Harvard as project leaders (e.g. Levy/Young, 1993). The empirical work within this project has focused on three regimes: intentional discharges of oil from ships (MARPOL); the fisheries of the Barents Sea; and transboundary air pollution in Europe and North America.
  - 8 This project is organized around the concept of "social learning" and led by William C. Clark at Harvard University. It is also in its final stages (Clark et al., forthcoming). The aim is to understand the long term interaction among governments, nongovernmental organizations, the private sector, the scientific community and the media in shaping the response of ten countries or country groupings to the emerging threats of acid rain, stratospheric ozone depletion, and climate change.
  - 9 Ken Hanf, Erasmus University, and Arild Underdal, University of Oslo, are heading a collaborative project on preparation, negotiation and implementation processes within the European acid rain context (i.e. LRTAP and the EU), financed by the EU Commission (Hanf and Underdal, 1994). A central focus is the links between the preparatory phase - the formulation of national positions and preferences - and the implementation phase. The policies of ten European countries are studied by almost as many country teams.

With regard to books and articles, the pile of relevant material is of course quite large. Starting with books, one of the "pioneer" studies on the LRTAP cooperation is Rosencrantz and Wetstone's 1983 "Acid Rain in Europe and North America", containing a number of country "profiles" and an early assessment of cooperative perspectives. The next frequently mentioned book is C.Park's 1987 "Acid Rain: Rhetoric and Reality", which contains one chapter on the various dimensions of the international politics of acid rain. A book in much the same vein is J.McCormick's 1989 "Acid Earth", with most of the book summing up various natural scientific and technological dimensions related to acid rain, and essentially one chapter devoted to LRTAP politics and achievements so far (mainly based on official emission statistics). A most relevant book in this connection is Boehmer-Christiansen/Skea's 1991 "Acid politics", which is a comparative assessment of the development of acid rain politics in West Germany and the UK, including special sections on the roles of the European Community and LRTAP in this process. The 1989 report by E.Chossudovsky, "East-West Diplomacy for Environment in the United Nations", offers a thorough account of the negotiations leading up to the 1979 Convention. With regard to the development of the regime, by far the most detailed account and analysis hitherto is found in T.Gehring's 1994 book "Dynamic International Regimes - Institutions for International Environmental Governance".

Turning our attention to articles and chapters in books, the 1990 article by C.Ian Jackson, "A Tenth Anniversary Review of the ECE Convention on Long-Range Transboundary Air Pollution", also comments upon the establishment of the Convention. The aforementioned G. Wetstone published a more up-dated assessment of the LRTAP regime in 1987; "A history of the acid rain issue", in Brooks/Cooper "Science for public policy". P. Sand offers a nice overview of the development of the LRTAP regime in his 1990 article "Regional Approaches to Transboundary Air Pollution". A general overview is also provided by A. Fraenkel (1989). The title of R. Shaw's 1993 chapter in G. Sjøstedt's (ed.) "International Environmental Negotiation" speaks for itself, "Acid-Rain Negotiations in North America and Europe: A Study in Contrast". In an almost similarly titled report edited by Sjøstedt in 1993, there are two contributions commenting upon the LRTAP regime: L.Bjørkbom's "International Environmental Policy in a Wider Context" and G.Persson's "The Acid Rain Story". M.Levy published the most thorough effectiveness assessment of the LRTAP regime so far in 1993, "European Acid Rain: The Power of Tote-Board Diplomacy", as a chapter in Haas, Keohane and Levy (ed.), 1993. He has also published a more recent analysis of the LRTAP regime in the 1995 Green Globe Yearbook (Levy, 1995). Sprinz and Vaahtoranta's 1994 article "The interest-based explanation of international environmental policy" investigates how factors like abatement costs and ecological vulnerability influence state policies toward controlling air pollution (see also Sprinz, 1992). J. G. Lammers offers an overview of both LRTAP and EC policy-making processes in "The European Approach to Acid Rain" (1988). Churchill, Kutting and Warren (forthcoming) offer an analysis of the 1994 sulfur protocol.



Regarding EC air pollution policies and the relationship to LRTAP, I can only briefly refer to for instance Haigh 1987, 1989; Boehmer-Christiansen/Skea 1991; and Liberatore, 1993.

Summing up, the pile of relevant material is of course quite large. However, the number of theoretically-founded LRTAP effectiveness studies is not so high; as far as I can see, five or six such case studies exist. The implementation literature is so far even sparser; the main drafts having so far been produced by the "Social learning" and Hanf/Underdal projects.

### 3. Compliance, Implementation and Effectiveness: Concepts and LRTAP Performance So Far.

#### 3.1. Some further, conceptual comments. Establishing a rough, initial measuring rod.

As announced earlier, the concepts of compliance, implementation and effectiveness need some further clarification. Turning first to compliance, it is first important to state that there is no crystal-clear international understanding with regard to the meaning of the concepts of "compliance" and "implementation".<sup>10</sup> This is understandable, as there are clearly areas of overlap. Nevertheless, I would suggest to define compliance simply as *the extent to which the targets/policy goals in the international agreement have been achieved or not*. As targets and policy goals can vary a lot, then compliance can simply be achieved by passing a national law and/or establishing an emissions reductions program - if the international agreement only calls for "national measures to be established". If the international agreement more specifically calls for say a 30% reduction of sulfur dioxide, then compliance can only be achieved by trustworthy reports of such a national reduction having taken place. However: thinking related to compliance is *not interested in the background for the reductions achieved*; they can be purely coincidental, for instance related to a general economic recession leading to reduced industrial activity. The sole interesting thing in a compliance perspective is: have the targets been achieved or have they not?

On the background of the discussion above, are there really any differences between the concepts of compliance and implementation? In some respects, I would say no. Also implementation has to do with the extent to which the international targets/policy goals have been achieved or not. But when we speak about "implementation", I find it reasonable to be much more concerned about the inherent societal *processes*. If for instance fuel switching automatically reduces your emissions with 30%, you have surely achieved compliance, but it would be misleading to say that you have actually "implemented" the international decision if you have not raised a finger in that connection. Hence, I suggest that implementation has to have something to do with *actual, national measures undertaken to fulfil the agreement*. Such measures can be of the more "formal" type, as a natural first step is the establishment of national laws and reduction programs. But the "real" implementation test is whether the behaviour of problem-creating target groups can be influenced and changed. Moreover, as implementation in the sense indicated above involves an effort to establish causal links to the

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10 For discussions of the compliance concept, see for instance Chayes and Chayes (1993) and Mitchell (1994). For discussions of the implementation concept in this context, see for instance Andresen/Skjærseth/Wettestad (1995) and Najam (1995).

international agreement, it goes almost without saying that implementation is an analytically more demanding concept than compliance.

Turning to the much-debated effectiveness concept, in an earlier paper (Andresen/Skjærseth/Wettestad, 1995), we have argued for a growing consensus on two main perspectives: a "political" perspective and an "ecological" perspective. The core element of the political perspective is national political/behavioral change, related to the regime. Compliance and implementation processes are integral elements of such processes of behavioral change - hence the placement of these two circles inside the wider effectiveness circle. But "true" effectiveness can be said to be something more/else: *solving the resource or environmental problem that spurred the international cooperation*. Hence, as most explicitly formulated by the Dartmouth/Harvard effectiveness project (Levy/Young, 1993), there is a certain relationship between these perspectives: political/behavioral changes and implementation processes are a necessary, but not sufficient, condition for resource or environmental problem solving. For instance: full implementation of a 30% reduction target may look nice, but may be less impressive if an 80% reduction is needed to really solve the problem.

With these conceptual deliberations as background, let us have a closer look at the actual LRTAP compliance figures.

### **3.2. The LRTAP compliance picture summarized.**

As already indicated, there are five subsequent policy processes and related regulatory protocols to focus on - and actually six processes when including the six first formative years leading up to the sulfur protocol. However, a complicating factor is of course that two of these processes and protocols have a fairly short history. The VOC process took place in the early 1990's (protocol was signed in November 1991), and the sulfur renegotiations were quite recently concluded (June 1994). Moreover, the 1984 EMEP protocol concerns funding of the monitoring program and is therefore not so interesting in a policy/regulatory context. Hence, it is not surprising that the attention of analysts so far has been directed almost solely at the first three processes: the "formative years"; the impact/implementation of the sulphur protocol; and the impact/implementation of the NO<sub>x</sub> protocol. However, as the obligations in the 1979 Convention were quite general, in terms of compliance, it is natural to focus on the 1985 sulfur protocol and the 1988 NO<sub>x</sub> protocol and declaration.

#### *"The sulfur compliance picture"*

At the third meeting of the Executive Body of the Convention in Helsinki, July 1985, 21 environment ministers signed the legally binding "protocol on sulfur emissions", basically

calling for a 30% reduction by 1993, with 1980 as baseline. The largest polluters who refused to sign the protocol were the UK, Poland and Spain; these three together accounting for about 23% of Europe's 1980 sulfur emissions.

An EMEP report from August 1990 sums up the 1989 "mid-term" progress. Interestingly, only five countries had not already achieved the 30% target in 1989 - USSR and Hungary were quite close (around 25%); Czechoslovakia and Bulgaria were making more marginal progress; only East Germany's emissions had actually increased. Six countries had already achieved 50% reductions or more (Austria and Sweden being the "leaders" with 64 and 59%), and five countries placed themselves somewhere in the "forties" (Norway, Finland, Denmark, Switzerland, and the Netherlands). With regard to the non-signers, three countries had achieved marked reductions around or above 20% (UK was in the lead with 27%, with Portugal and Ireland having achieved around 20% reductions); a group of six countries had achieved small or no reductions at all (among them Spain), and in two countries, emissions had increased considerably (Turkey 28% and Yugoslavia 40%). On average, the signers were doing markedly better than the non-signers.

Compared to the 1989 figures, there are few surprises in the final compliance picture (LRTAP secretariat, "1994 major review on strategies and policies for air pollution abatement"; see annex 1). However, political changes in Eastern Europe led to a somewhat different picture. Two of the signers/non-compliers have changed considerably midterm. The main part of the former USSR - i.e. Russia - joins the compliers with a fair margin (around 50%). Ukraine and Belarus also make it into the complier club. Although East and West-Germany have merged, the new, united Germany achieves compliance with a fair margin (close to 50% reductions). Several countries have achieved around 70% reductions (Austria, Denmark, Finland, France, the Netherlands, Norway and Sweden). Regarding the non-signers, there are some interesting features. The UK has landed on 37%, thus making it a de facto complier. Portugal has actually increased its emissions, while there are no figures for Spain after 1990.

Summing up: given that the 21 Parties overall reduced emissions by around 48%, and that all the Parties have reached the target, the 1985 sulfur protocol part of the LRTAP regime must be said to be characterized by very high compliance.

#### *"The NO<sub>x</sub> compliance picture"*

As can be recalled, the 1988 NO<sub>x</sub> protocol called for the stabilization of emissions at the 1987 level from 1994 onwards, and the related political declaration (signed by 12 countries) called for a 30% reduction by 1998. The main compliance picture may be summed up in the following manner (for a comprehensive overview, see annex 2) :

First, considerable data problems complicate compliance assessments. For instance, Italy, Liechtenstein, Luxembourg, Spain, and the European Community have not reported NO<sub>x</sub> emission levels for the years after 1991. Moreover, Liechtenstein, Luxembourg and the European Community have not reported emission data for the base year 1987.

Second, existing data indicate that 18 of the 25 Parties had stabilized their emissions in 1990 and overall reduced them by 4% by 1993. Three Parties have increased emissions by 4 to 41 % above 1987 levels.

Third, as indicated by the overall 4% emission reduction so far, progress in relation to the 30% declaration target is so far modest. Austria, Denmark and Switzerland are the only countries which seem to be reasonably on schedule so far (15-20% reductions).

Summing up: although assessments are complicated by considerable data problems, compliance with the 1988 protocol seems to be fairly high. However, the perspectives with regard to the related 30% reduction target are not very bright.

*"What about VOCs?"*

Data are here very scattered so far. However, of the eleven countries (out of 23 Parties) providing data for 1993, an overall reduction by around 15% may be noted (see annex 3).

### **3.3. Some brief notes on problem solving so far**

As already indicated, no matter how the compliance questions discussed above turn out, environmental problem solving may still be far away. So what may be said about this tricky issue so far? The more recent discussions and model development related to the "critical loads" concept may give us certain indications. Hence, if problem solving is seen as synonymous with the achievement of "critical loads" (see section 2) in Europe, then it is clear that most countries have quite some way to go before these "critical targets" are achieved. The targets in the new sulfur protocol aim at minimum 50% reduction of the gap between 1990 sulfur depositions and the critical levels in the environment. Hence, even if for instance the UK achieves its 80% emissions cuts targets within 2010 (with 1980 as baseline year), then the country's emissions will still be some 50% above "ideal" levels.

Another matter is that there is no direct, linear relationship between emission cuts and environmental improvements. We are talking about gradual and cumulative processes, where both positive and negative effects may only be seen years and even decades after changes in emissions. Take for instance the Norwegian situation: over the same time that emissions in Europe have been cut by around 40%, acidification damages in Norway have gradually

increased - up to a 1995 peak damaged area, with over 110 000 km<sup>2</sup> receiving more sulfur than nature can handle (Miljøspesial Sur Nedbør, January 1995). Moreover, although the rainfall has become less acid in recent years, acid deposition has not decreased accordingly, due to increased rainfall patterns.

Hence, summing up, the acidification problems have probably been reduced somewhat, but "solution" and getting below "critical loads" in the environment is partly a matter related to the implementation of newly established regulations, and in reality extending well into the next century.

## 4. Explaining Compliance: Some Important Country Profiles

### 4.1. Introduction

As it is far beyond my capacity to cover all the LRTAP countries even quite briefly, and a specific Russian LRTAP case study is underway within the project, I have picked four countries for closer assessment in this connection: the UK ("net pollution exporter"; important "laggard"); Germany (important emitter; gradually important "pusher"); the Netherlands (generally interesting with regard to international and national environmental politics); and Norway ("net pollution importer"; initial "pusher" getting into trouble..).

Inspired by Underdal's three models for explaining compliance and implementation (1995), I group and discuss the countries' performance according to two main perspectives. The first "*national interests*" perspective focuses on the overall cost-benefit picture related to abatement measures. As stated by Underdal (1995), "this model focuses attention on the calculations that a single, rational decision-maker would go through in deciding whether or not to act as prescribed in an agreement" (p.2). In other words, in this perspective, a "progressive" negotiating position and a willingness to sign an agreement do not necessarily mean implementing activities and compliance. It should also be noted that parts of the damage cost reductions in this perspective have to do with changes in other countries' policies; "the more important the benefits that comes from the compliance of *others*, the more the incentives to comply will depend on the impact of an actor's own behaviour upon the behaviour of its partners" (Underdal, *ibid.*:5). Both scientists and policy-makers seek for simple and parsimonious time-saving information, and hence an interesting question is here: do we really need to know more than a country's basic interest structure, with regard to costs and benefits to account for the implementation performance of countries? Research so far has indicated that the unitary rational actor and the "national interests" perspective has been a powerful analytical tool when predicting negotiating positions (Sprinz/Vaahtoranta, 1994). But is it equally powerful in throwing light on the complex implementation processes?

The other "*domestic politics*" perspective relaxes the unitary actor focus of the first perspective, and focuses on how various domestic actors, with sometimes conflicting interests, shape the implementation processes and outcomes. According to this model, neither national positions nor implementation records can be understood simply as a derivative from some "objective" calculation of national material interests. Underdal (1995:12-13) indicates three main deviant points: first, decision-makers as well as the general public conceive of costs and benefits in "subjective" terms, and values and beliefs may differ significantly within, as well as across, societies; second, actors are concerned not only with maximizing net national welfare; they typically have some more "parochial" concerns that affect their

behaviour; and third, political systems distribute influence and power unequally, and political processes tend to produce outputs and outcomes that can deviate systematically from those that would maximize "net national welfare" as conceived of in the unitary rational actor model.

"Domestic politics" can of course be classified and typologized in a number of ways (for a comprehensive overview over reasonable assumptions and propositions, see Underdal 1995). My suggested rough and simplified analytical scheme in this context focuses on five main categories of factors:

- 1) regulatory philosophies ("general"/more long-term and "specific"/short-term/issue-related), where it for instance can be assumed that factors like the weight given to "precautionary" policies and the degree of "interventionism" and the general weight given to economic decentralization and privatization can influence implementation efforts;
- 2) intra-governmental/inter-ministerial power balance, where there are of course a number of interesting dimensions, related to the distribution of power and influence among different branches of government; the extent to which the government controls state policy; and the extent to which the state in effect governs and controls "its" society (Underdal, 1995:17);
- 3) the role of polluters/target groups, where for instance consultation procedures and participation patterns in earlier policy phases can be assumed to influence implementation efforts;
- 4) the role of "interested thirds" like public opinion and "green" (NGO) forces, where an interested and critical public and a strong and active NGO community can be assumed to strengthen implementation efforts;
- 5) the "personal" factor - e.g. the "Thatcher factor", which serves as a reminder that policy and implementation performances may sometimes be heavily influenced by the political and ideological visions of strong leaders.

It should be noted that the important question of access and participation which is a special focus in this project is touched upon in several of these categories. An important, but again tricky, question is of course whether the "explanatory balance" is roughly similar in the selected countries - or whether this varies widely between the countries.

In addition, the broader questions of "international factors" and regime influence are discussed separately. It should be noted that the two models point to different mechanisms



for regime influence. The "national interests" perspective pinpoints possible implementation bonuses or sanction costs, while the "domestic politics" perspective pinpoints the impact that the regime may have upon the domestic distribution of formal authority and influence and incentives generated by the act of signing (Underdal note, 1995:17).

Moreover, some general comments to the (implementation) knowledge situation are provided for each of the cases. As this knowledge situation varies quite a bit, and the commitments taken on also varies a bit (e.g. the UK and sulfur), there are certain minor "adaptations" of the common structure outlined above.

The first focused case is the UK.

## **4.2. The UK story: "process laggard" and "rough complier"...**

### ***4.2.1. A rough overview of the knowledge situation***

Regarding the more general acid rain policies of the UK, these are commented upon for instance in Rosencrantz/Wetstone (1983); Park (1987); McCormick (1989); Boehmer-Christiansen/Skea (1991); Boehmer-Christiansen (1995); and Boehmer-Christiansen/Weidner (1995). My main sources with regard to the more specific implementation/effectiveness questions are McCormick (1989); Boehmer-Christiansen/Skea (1991) (hereafter: B/S); Waterton (1993); and Boehmer-Christiansen (1995). Overall, it seems fair to say that UK, along with Germany, are the best-studied countries in this connection so far.

### ***4.2.2. The LRTAP compliance picture to be explained.***

Regarding sulfur, although the UK was not willing to sign the 1985 protocol, it has achieved a 37% cut in emissions in the time period in question. With regard to NO<sub>x</sub>, after related long wranglings and compromise solutions within the EC context, the UK signed the 1988 protocol, and has seemingly achieved the 1994 freeze target (based on 1995 figures) (ECE, "Strategies and Policies for Air Pollution Abatement", 1995). Hence, it seems to make sense to speak about an international "process laggard" and at the same time, a "rough complier". How, then, has this come about?

### ***4.2.3. The "national interests" perspective.***

Point of departure: throughout the 1980's, the UK produced around 4 million tonnes of SO<sub>2</sub> per year (e.g. 4.9 million tonnes in 1980 and 3.8 million tonnes in 1990), making it the biggest emitter in Europe and fourth biggest in the world. It has been producing around 2.5 million tonnes of NO<sub>x</sub>, making it one of the five biggest producers in the world. It derives

over 90% of its energy needs from fossil fuels, and most of that from coal-fired power stations. As the coal and electricity were in public ownership during the 1980s, policy-making has been characterized as "partially determined by the distinct framework within which the nationalized industries have operated" (B/S:121). Other countries account for only around 10% of all acidity in UK rainfall (e.g. McCormick, 1989:93-94), so the role of the UK within the European atmospheric system is one of "*major net exporter*".

Turning then to the general cost-benefit picture; as imaginably assessed by a central decision-maker, can this be assumed to have been very clear at the beginning of the two processes, and did it change drastically over time? Turning first to *SO<sub>2</sub>-related costs* and the situation in 1985, given the position of the UK as a major emitter and "net exporter", on the surface, it seems reasonable to expect major costs being related to emissions reductions. However, when talking about costs in this connection, it is useful to distinguish between "*general*" emissions reductions costs and "*specific*" (retrofitting) reductions costs. "General" reductions costs are related to all sorts of "external" industrial and economic processes, and in the case of UK, it is not certain that these costs would be very high, in order to achieve the 30% reductions goal. The UK's sulfur emissions fell by 37% between 1970 and 1984, allegedly due to industrial recession and increasing use of sulfur-free natural gas (McCormick, 1989:101). Energy demand peaked in 1979, remained lower in the 1980s than in 1973 (B/S:130). Similar processes probably continued up through the 1980s and into the 1990s...

However, "specific" reductions costs were potentially higher and more uncertain. These costs were mainly related to the eventual retrofitting of the Central Electricity Generating Board's (CEGB) power stations with flue gas desulfurization (FGD) technology.<sup>11</sup> For instance related to the 1984 House of Lords proposition to retrofit two power stations and generally cut sulfur emissions by 30%, CEGB claimed that this would cost 2 billion pounds, raise electricity costs by 10%, and increase unemployment (McCormick, 1989:102). The preferred technological option was the "Pressurised Fluidised Bed Combustion" (PFBC), but this technology was not satisfactorily developed yet (Waterton, 1993:20). On the other hand, Friends of the Earth's (FoE) cost analysis of reducing the CEGB's SO<sub>2</sub> emissions by 60% by 1995 (mainly based on FGD retrofitting) suggested that this could be achieved by an added 4% on the price of electricity to consumers (Waterton, 1993:70). According to B/S, the government deliberately leant towards the highest cost estimates, knowing that this would automatically guarantee Treasury opposition...(p.215). To my knowledge, no independent, comprehensive input to this debate was produced. Another potentially important dimension to this debate was the government's plans to build several nuclear power plants in the 1980s and 90s, hence forming the perception of the acid rain problem as a temporary one, and not

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11 It can here be noted that 60% of the power output comes from 12 large coal-fired power stations, see B/S:143.

worth spending much money on...(Waterton, 1993:18). Hence, it seems fair to say, overall, that *costs were uncertain, but potentially high*.

With regard to *benefits*, there was some reported lake acidification and forest damages in the first part of the 1980s. But many parts of rural UK was not covered by monitoring stations until the late 1980s, including Wales, one of the areas which have turned out to be worst affected by acidification (McCormick, 1989:111; Waterton, 1993:10;39). Still, available evidence made the Environment Committee of the House of Commons state in its 1984 report: "immediate and hard financial decisions have to be taken as time is running out...Enough is now known to justify the development and application of technology for removing the causes and effects now abundantly apparent" (cited in McCormick, 1989:99). However, other reports at the time, like the one from the House of Lords European Communities Committee challenged the certainty of the link between acid depositions and tree damage. Hence, although environmental benefits related to abatement efforts were probable, the size of these were *marginal and clearly disputed*.

Hence, overall, although both costs and benefits were disputed in the mid 1980s, as is often the case, costs probably seemed more tangible and specific - much falling on the powerful actor CEGB - than the environmental benefits involved. For instance, B/S sums up the picture like this: "The cost of retrofitting existing power plants with flue gas desulphurization would have had a major impact on public finances without any apparent compensatory benefits" (p.278).

Moving on to the *NO<sub>x</sub>-related rough costs and benefits picture*, this issue is very much related to EC negotiations on the Large Combustion Plants (LCP) directive and the vehicle emissions directive, both initiated by Germany in 1984. As this directive was aimed both at sulfur and NO<sub>x</sub> emissions, and at power plants, the cost discussion is probably pretty similar to the story told above; it is hard to discern the specific NO<sub>x</sub> component. This is easier with regard to the vehicle issue, more directly aimed at NO<sub>x</sub> emissions. The FRG's aim was the US vehicle standards for new vehicle types, meaning in practice catalytic converters for all new vehicles. The UK opposed this idea vigorously, due to the commitment to "lean-burn" technology by the nationally owned British Leyland and Ford Europe. The benefit picture is probably quite similar to sulfur; in brief, moderate and diffuse.

Briefly summing up, the rough cost-benefit picture may have seemed fairly similar to British authorities at the establishment of both protocols: on the one hand, potentially high costs, falling on specific societal actors; on the other hand, more moderate and diffuse benefits. If so, why did the UK refuse to sign the sulfur protocol, but agreed to take on the 1988 NO<sub>x</sub> stabilization requirement?

#### 4.2.4. *The "domestic politics" perspective*

Here, it seems reasonable to distinguish between two main questions: first, how can domestic political factors account for acid rain policies in the first part of the 1980s? Second, why the "conversion" to a more active policy/"implementation" from the late 1980s on?

##### 4.2.4.1. *The "initial", "malign" picture*

###### *"Regulatory aspects/philosophies"*

Let us first turn to the situation in the early 1980s. In this connection, the first natural explanatory perspective has to do with regulatory philosophy. One may distinguish between "general", more stable dimensions of regulatory philosophies and more "specific", temporary dimensions. Let us first turn to an important "specific" dimension. In brief: the Thatcher government believed strongly in free enterprise, and sought actively to minimize industry regulations. "Privatization" was an important keyword. At least in the case of the UK, this philosophy was unfavourable to acid rain policies in two respects; first, given the energy structure, major emissions reductions had to include new regulations and power plant retrofitting. Although electricity privatization only began in practice in 1988, "...ironically, given the government's ultimate intention of freeing the industries from state control, the 1980s saw even tighter controls on the nationalized industries, particularly on their finances" (B/S:123). Second, general deregulation and privatization plans meant increased uncertainty about the future ability to live up to national and international commitments - even if the general wish to do so increased.

Turning to some "general" dimensions, first, the British give general weight to the importance of having sound scientific bases before taking action. In the acid rain debate, although the international transport debate was very much over by 1983/4, considerable uncertainty remained, for instance regarding the relationship between depositions and effects, both in the main "importer" countries and in the UK itself (Waterton, 1993:19-20). Not surprisingly, this uncertainty was utilized for all it was worth. In this connection, it has been maintained that scientific uncertainty functioned as a "fig leaf" for underlying economic and political interests (Boehmer-Christiansen, 1995:28). It should also be noted in this connection that the CEEB funded a variety of research projects in this area; almost half the UK's total expenditures in the early 1980s. The DoE increased its research efforts from 1980 on (B/S:207-9; Waterton, 1993:44-50).

A second, "general" regulatory philosophy dimension that should be mentioned is the allegedly British general weight given to "implementation soberness"; in other words, not signing agreements which it was uncertain it could implement (Boehmer-Christiansen,

1995:87-88). This was cited as a reason for not signing the 1985 SO<sub>2</sub> protocol; according to McCormick (108), this was another "fig leaf" for other, underlying interests.

*"Intra-governmental/inter-ministerial power balance"*

Cutting a much longer story short: according to McCormick (1989:109), the environmental policy-making structure is "confused and piece-meal", and the "misnamed" Department of the Environment has been characterized as weak and more geared towards local government issues than the natural environment (B/S:109-11). The Treasury Department is characterized as the most powerful of the departments, and sceptical to any proposals with public expenditure proposals. The department of Energy (DEn) has been characterized as a powerful actor, defending the interests and policy objectives of the energy sector. Likewise, the Department of Transport (DTp) held "a strong stance in defence of its interests". In addition, the Department of Industry (DTI) advanced deregulation, and sought to ensure that environmental controls did not hinder the competitiveness of British industry (Waterton, 1993:3-4; B/S:111-12). This general climate allegedly also gave other important actors like the CEEB high freedom of action. However, as already indicated, in 1984, reports from both the Royal Commission on Environmental Pollution, the Environment Committee of the House of Commons, and (somewhat more moderately) the House of Lords European Communities Committee all called for cuts in UK SO<sub>2</sub> emissions. Hence, there *were* quite centrally placed political forces calling for new measures. But they were obviously not strong enough...

A specific example is mentioned by B/S: DoE argued in a "crucial" 1984 meeting of the "inner circle" (see below) for the UK joining the "30% club", but lost to CEEB's scientific uncertainty-based arguments (p.215).

*"The role of target groups"*

According to Boehmer-Christiansen (1995), target groups like industry and car manufacturers have held and hold a strong position in policy development and implementation processes, viz. "the UK will not agree to specific targets until implementation is virtually promised by industry" (p.87). Before and during privatization, the cooperation of industry has been particularly important for the government, and made confrontation "quite impossible" (p.87). Hence, implementation so far has largely been an affair between government and industry, the electricity utilities and car manufacturers (p.88).

*"The role of 'interested thirds'"*

The role of public opinion throws further light on the impotence of the "green" forces in these years. In brief, the acid pollution problem never became an important public issue in

the same way as it did in West Germany or Scandinavia. For instance, it was not until 1983 that Friends of the Earth launched their Acid Rain Campaign (Waterton, 1993:76). This is partly related, as indicated earlier, to the lack of visible damages, but also related to deeper "cultural" aspects; "...British environmental interests tend to be focused on landscape rather than air quality" (B/S:277). However, a certain discrepancy between the general disinterested public and some activist/NGO forces should be noted here.

#### *"The personal factor"*

Here, several authors emphasize Margaret Thatcher's particular style of decision-making, relying on the discussion among a few selected, key scientists and policy-makers. This seems to be how, for instance, the 1984 decision not to join the growing "30% club" came about (B/S:215; Waterton, 1993:18).

#### *4.2.4.2. Changes in the picture...*

Turning to the situation in the late 1980s, one may throw light over both the sulfur "conversion" and NO<sub>x</sub> picture. Important policy changes took place both in 1986 and 1988. In 1986, the CEEB announced the decision to fit FGD technology to three power stations, and to fit low NO<sub>x</sub> burners at its 12 largest coal fired power stations, aiming to reduce NO<sub>x</sub> emissions from these stations by up to 30% by 1998 (Waterton, 1993:28). In 1988, as indicated earlier, the UK agreed to both the EC LCP and vehicle emissions directives. In terms of the explanatory perspectives discussed above, the role of the public opinion seemingly changed somewhat from the mid 1980s on. Acid damage to the UK countryside became more visible, although the extent of damages remained disputed throughout the 1980s. For instance, the Forestry Commission stated in 1987: "There is no sign of the type of damage seen in West Germany occurring in Britain at the moment" (Waterton, 1993:83-86). Moreover, the personal factor is seemingly also here of some importance. The visit of Lord Marshall of the CEEB to Scandinavia in 1986 is mentioned as an important background factor (Waterton, 1993:23-24). Moreover, the first results of the CEEB-funded SWAP program allegedly also influenced the 1986 changes (Waterton, 1993:17;45).. But in order to throw more light on these processes, it is necessary to bring in the international perspective more systematically.

#### *4.2.5. The role of international factors.*

The UK drew fire from two international contexts in the 1980s: the LRTAP regime and the European Community. Within LRTAP, especially Norway and Sweden led a campaign in order to put pressure on the UK. As a part of this, Norwegian scientists engaged in collaborative research projects with British researchers, like for instance the SWAP program

("Surface Water Acidification Project"), focusing on the impact of acid rain on the soil, waterways and fisheries of Norway and Sweden.

Within the EC, political forces led by Germany put pressure on the UK. First, there was the Large Combustion Plant (LCP) negotiations, started in 1984. In June 1988, the UK agreed to cut its sulfur emissions from existing combustion plants by 20% (1993); 40% (1998); and 60% (2003), with 1980 levels as baseline.

Second, the negotiations on the vehicle emissions directive was initiated by Germany in 1984. FRG's aim was the US vehicle standards for new vehicle types, meaning in practice catalytic converters for all new vehicles. The UK opposed this idea vigorously, due to the commitment to "lean-burn" technology by the nationally owned British Leyland and Ford Europe. As the EC context is not my main focus here (important as it is), suffice it to say that the ensuing battle between governments, the car industry and environmentalists ended in the "Luxembourg (compromise) package" in 1987, requiring only cars with engines above 2 litres to have catalytic converters, affecting only 10% of the cars manufactured in the UK (Waterton, 1993 34-35)....

These negotiations were conducted simultaneously with the LRTAP NO<sub>x</sub> protocol negotiations, and it seems reasonable to assume that the outcome of the EU processes more or less set the stage for the UK's decision to sign the NO<sub>x</sub> protocol. Hence, the implementation of the NO<sub>x</sub> protocol can also possibly be seen as a mere externality of the UK's implementation of the EU directives.

On the whole, there seems to be much evidence pointing towards the conclusion that international pressure and processes have played a quite important role for the evolution of British acid rain policies, e.g. given the overall rather lukewarm domestic interest in the issue. But: which settings have mattered most - LRTAP or the EC? Levy (1993:124) argues for an important initial role for LRTAP: "It is highly unlikely that the sulfur reduction measures adopted by the British government would have been adopted in the absence of the sulfur protocol". This is primarily based on the role of the protocol as a "landmark" that exerted a profound influence on the domestic debate. According to Levy, to argue that the sulfur protocol did not play a role for the Brits, one would have to argue that the Norwegian and Swedish pressure alone would have been sufficient to bring about the same policy changes. However, this leaves open the question with regard to the possible interplay between Scandinavian and EC pressure even at this stage. In the name of fairness, Levy does emphasize the importance of especially German pressure within the EC for the UK policy changes from 1988 on (p.126). Boehmer-Christiansen/Skea seem to put a little more emphasis on the EC context: "The successful international pressure on the UK to moderate its policy came not from Scandinavia, where there is conclusive evidence of environmental damage to

which the UK contributes, but from the FR Germany which is relatively unaffected by UK emissions and from the EC where one of the major concerns is uniformity of control costs" (p.283).

Another matter is that *formal* implementation of the EC directives only started in the late 1980s, and hence played only limited roles for the reductions achieved within the 1993 LRTAP context. On the other hand, there is the tricky analytical possibility of "anticipatory" measures, so the issue needs further investigation.

#### **4.2.6. Concluding comments**

First, it is important to note that only a limited "amount" of *formal implementation* has so far taken place in the UK, given that no formal commitments were undertaken before 1988. Moreover, as research usually lags somewhat behind policy development, this means that there is not much UK "acid implementation" research to build on so far. For instance, an important piece of work like Boehmer-Christiansen/Skea was published in 1991. Keeping this in mind, there are still some relevant questions to ponder about.

*"Why a 'process laggard'?"*

Some important points: generally, "export" of pollution and relatively marginal domestic damages have reduced the weight of domestic abatement benefits compared to more tangible costs, such costs falling mainly on the electricity industry at a time of tight restrictions on public expenditure.

Turning to the more specific points: "general" and "specific" regulatory philosophies were unfavourable to governmental, preventive policies.

Moreover, relatively weak governmental environmental bodies had a tough match in intra-governmental fights;

Important "target groups" like industry and car manufacturers had a strong position in policy talks;

Although there were some important social actors arguing for tougher measures, the public at large were moderately interested.

*"Why a 'rough complier'?"*



Primarily "non"-environmental processes like economic recession and energy changes (reducing the role of coal and the power of unions) were seemingly pretty important;

Also some "environmentally related" measures seem relevant (e.g. 1986 measures), related to international pressures. In addition, more weight was given to the import of low sulfur coal and the construction of additional gas generating capacity (Waterton, 1993:29). However: actual retrofitting and implementation started in the early 1990s, so their importance for the 1993 and 1994 targets is uncertain...<sup>12</sup> Moreover: EC processes were relatively more important for NO<sub>x</sub> than for sulfur compliance;

Generally, far more attention has seemingly been given to the UK's role of "process laggard" than to explaining actual, rough compliance.

*"Some further comments to the knowledge situation"*

Generally, the case seems to be far more a matter of there being certain tricky areas of little or no research than actual conflictual assessments so far. This is partly related to the fact that several contributions build on the seminal "Acid Politics"-book by Boehmer-Christiansen and Skea. Two interesting, somewhat related tricky areas where not very much has hitherto been done are, first, the question of the interplay between EC and LRTAP processes - both with regard to general policy-making and the related implementation processes. However, two recent contributions by Sonia Boehmer-Christiansen go some way in rectifying this situation (Boehmer-Christiansen, 1995; Boehmer-Christiansen/Weidner, 1995). The second area of interest is the international-domestic interplay. For instance, B/S states that "international pressure, unless accompanied by similar domestic demands, is likely to stimulate an initially defensive response from countries accused of transboundary pollution...In the UK..other political factors tended to militate against action, until international pressures, coupled with a rapidly evolving domestic agenda, converged to permit the formation of a more limited acid emissions abatement plan" (282-83). Here, an interesting, further "access question" is to what extent and how the various British pro-acid controls forces utilized information from and access to the LRTAP discussions and processes.

More generally, with regard to the access perspective, the challenge related to the UK would be more to pull together existing information and do some limited interviewing, partly with some key authors, more than having to dig up very much new material. For instance, Waterton covers the NGO activity quite well (pp.65-80).

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12 According to Boehmer-Christiansen (1995), FGD retrofitting has recently largely been abandoned (pp.67-68).

### **4.3. The German story: "process pusher" and "complicated complier"...**

#### ***4.3.1. A rough overview of the knowledge situation***

Regarding the more general acid rain policies of the FRG/Germany, as was the case for the UK, these are commented upon in Rosencrantz/Wetstone (1983); Park (1987); McCormick (1989); Boehmer-Christiansen/Skea (1991); Jager/Cavender Bares/Blumhuber/Loerbroks (1993); Boehmer-Christiansen/Weidner (1995) and Wahl/Sprinz (1995). My main sources with regard to the more specific implementation/effectiveness questions are Boehmer-Christiansen/Skea (1991) (hereafter: B/S) and Jager et.al. (1993). Overall, as already indicated, Germany are among the best-studied countries in this connection so far.

#### ***4.3.2. The LRTAP compliance picture to be explained.***

Germany was originally a LRTAP "laggard" in the negotiations leading up to the 1979 Convention. A radical policy shift took place in 1982, related to the "Waldsterben" crisis. In short, the "Waldsterben"/pine forest dieback phenomenon had gradually got increased attention, culminating in 1981 in among other things a report on potential SO<sub>2</sub>-related vegetation damage from the Council of Experts on Environmental Questions (SRU) and a three part series on "Waldsterben" published in "Spiegel". Germany has since then taken on a "pusher" role in the LRTAP cooperation.

With regard to the sulfur process: as can be recalled, the new, united Germany ended up as a clear complier in relation to the 1985 sulfur protocol, although with a more complicated period in the early 1990s. This has of course primarily to do with the unification process, with the environmental "leader" West Germany teaming up with the definite "laggard" East Germany (whose emissions actually increased in the latter part of the 1980's!). It is therefore primarily interesting to focus on the performance of West Germany up to 1990/91. As can be recalled, BRD was well on its way in the 1989 tentative review, having reduced by about 55%.

Regarding NO<sub>x</sub>, the picture is pretty similar: high performance up to 1990/91, for instance with the electricity industry reducing its emissions by 50% of their 1982 value. Still, according to the most recent LRTAP review report, in 1992, Germany had reduced NO<sub>x</sub> emissions with around 15% in relation to the 1987 baseline, making it the second best performer in the "NO<sub>x</sub> class".

What has been the background, then, for this quite impressive performance?

#### ***4.3.3. The "national interests" perspective.***

Point of departure: according to the LRTAP 1994 review, the amount of SO<sub>2</sub> emitted in 1980 was 3,2 million tonnes, falling to 2,4 million tonnes by 1985; the FRG being the fourth or fifth biggest emitter in Western Europe. Power plants and district heating plants have contributed around 56%; coal-fired power plants have contributed around 28% of total emissions (Jager et.al., 1993:33). Compared to the UK "net, large exporter" position, the German "export/import" balance sheet has been much more even: roughly as much has been exported as imported (e.g. Park, 1987:165). The annual amount of NO<sub>x</sub> emitted has been just below 3 million tonnes (LRTAP 1994 review), and here the transport sector has been by far the most important source.

On this background, let us turn to the cost-benefit picture, as imaginably assessed by the government. This may, in fact, in many ways be seen as quite clear. Due to various previous regulatory activity, it is quite probable that the 30% reduction was achieved already in 1985. German air pollution regulations date back to the mid-60's, and with the Federal Clean Air Act established in 1974 as an important intermediate step. However, the clearly most important piece of legislative action was proposed toward the end of 1981, related to the increasing concern about dying forests. This was an *Ordinance on Large Combustion Installations, the GFAVo*. When the GFAVo was finally adopted in 1983, it had been considerably strengthened. It applied to 1500 power stations, aiming at halving SO<sub>2</sub> emissions by 1993 (e.g. McCormick, 1989:131). According to B/S, "Most of the coal-fired power stations in the FR Germany were fitted with flue gas desulphurization (FGD) equipment over a remarkably short period of time, between 1983 and 1988" (p.6). Moreover, according to McCormick (1989:131), 25% emissions reductions were achieved in 1985 (compared to 1980). Hence, the *specific* costs related to complying with the 1985 LRTAP protocol were probably close to zero. The 30% reduction and even considerably higher reductions lay inherent in regulations and policies adopted before the 1985 protocol. However, the more *general* costs of cleaning up the power stations and implementing the GFAVo has been estimated to be around 21 billion DM (B/S:201). This is probably related to the fact that it is more costly to retrofit the FGD technology to an existing power station. According to B/S, FGD will add around 15% to the basic cost of a modern conventional coal-fired power station (p.45). With regard to NO<sub>x</sub> reduction, the basic industrial technology is the "selective catalytic reduction" (SCR) processes. Around 7 billion DM, out of the 21 billion referred to above, have been spent on SCR retrofitting (B/S:201).

Turning to *benefits*, with regard to reductions in pure "domestic" damage costs, this must probably be characterized as uncertain, but potentially quite significant, even if politics is kept out of the picture. As a background, it should be noted that one-third of FR Germany is covered with forest, and of this, over one-third is privately owned. While most forests are exploited for timber, they also raise income through hunting and tourism (B/S:67). The forest damage threat perception changed quite dramatically during the first part of the 1980s. According to the Minister of Agriculture, in 1982, most of the German forest was not damaged - the damage area was estimated to cover about 8% of the forested area, and 3/4 of the damage was not considered "serious" (although increasing) (Jager et.al., 1993:44). In 1983 the damage area was estimated to 34%, and in mid-October 1984 a survey indicated 50.2%! The total proportion of forests either moderately or seriously damaged peaked at 19% in 1985, double the 1983 level (B/S:190). The Federal Interior Ministry warned that economic damage worth several thousand million DM per year would result if damage to forests continued to spread (McCormick, 1989:129-30). B/S refer to estimated annual damages in the range between 10-40 billion DM (201), however this figure is much more controversial than the abatement costs...

What about "international" benefits, then? As domestic damages were seemingly quite substantially related to domestic emissions, the "international" benefits were probably much related to economic competitive aspects. But there was also some "purely environmental" sense in making others reduce their emissions, as about 50% of the air polluting substances was "imported" from other states (Jager et.al, 1993:41). In other words: a strong compliance performance would underpin German leadership efforts in establishing and implementing international regulations - which in turn would mean "fairer" competitive conditions for German industry, and contribute to reduced domestic damages. B/S (186) put it like this "...GFAVo constituted both a deed done unilaterally and a model to be followed by others. It was confidently expected in 1983 that European partners would be required to follow the German example in good time" (p.186). But, on the whole, domestic factors were probably by far the most important for air pollution regulation, at least the GFAVo portion of it.

#### 4.3.4. *The "domestic politics" perspective.*

##### *"Regulatory aspects/philosophies"*

Turning first to the question of regulatory philosophies, a first aspect to note here is the German weight on Law and the legal system. In the 1970s, this allegedly led to a system with very impressive regulations and procedures (e.g. the important and several times revised TA Luft directive), but much more limited "real" action. This has changed after 1982. Moreover, in the late 1970s, industry itself actively sought new, federal air pollution legislation to avoid being faced with differing local regulations (B/S:282).

A second general aspect is the "Vorsorge" or precautionary principle, introduced in the SPD/FDP government's environmental program already in 1971. A crucial element here is the ability to act before scientific certainty has been established, and the principle has been given weight by shifting governments, social-democratic and conservative.

Thirdly, one may note a generally quite "interventionist" economic management tradition (at least compared to the UK), through regulation or financial assistance - either due to strategic significance or in order to achieve broader economic objectives (B/S:124). Pollution control programmes did not run counter to this tradition... However: in the field of energy policy, the role of market forces has been stressed in the 1980s (B/S:133).

##### *"Intra-governmental/inter-ministerial power balance"*

The next perspective has to do with inter-governmental/inter-ministerial power balance. Setting the bureaucratic/political scene: compared e.g. to the UK, the German party-political scene is more complex. Until around 1980, four parties dominated the scene: the Christian Democratic Union (CDU); the Bavarian Christian Social Union (CSU); the Social Democrats (SPD); and the small Free Democratic Party (FDP). Important in this connection: the emerging green movement brought a fifth party to the bargaining and coalition scene in 1980: the Green party, competing not least with the FDP about middle class voters... The regional dimension is also potentially more prominent here than for instance in the UK, due to the federal structure of the political system, with significant powers delegated to the ten (now 15) Länder. Moreover, the federal structure implies frequent elections, and hence a basic sensitivity of political parties to changing public moods. With regard to the ministerial set-up, up until 1986 (and the Chernobyl accident.), pollution control responsibilities lay with the "influential"<sup>13</sup> Federal Interior Ministry (BMI). In 1986, the smaller and more specialized Federal Ministry for Environment, Nature Protection and Reactor Safety (BMU) was

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13 B/S's assessment, p.106.

established. Other important ministries in this connection are the Federal Ministry of Economics (BMWi) and the Ministry of Finance (BMF). There is no separate energy ministry, and the BMWi is also responsible for energy policy.

SPD and FDP formed a governmental coalition in the years 1969-82. All three Interior ministers between 1969 and 1982 were FDP members, and all the ministries most directly involved in the air-pollution debate of the early 1980s were in FDP hands - Foreign Affairs; Economics; Agriculture; and Interior. When Helmut Kohl and CDU/CSU took over in 1982, the FDP lingered on as a coalition partner, and kept control over the finance ministry.

On this summarical background, let us zoom in closer. As the "roots" of the FRG compliance picture very much seem to stem back to politics in the early 1980's, the more general (eco)political situation in these "crucial" years has to be focused. Turning first to political, organizational factors, it may be possible to discern some more or less counterbalancing factors. On the one hand, there are several factors giving extra political energy to the issue of air pollution regulation from the early 1980's on. First, there is the general political situation in the early 1980's. It has been argued that the need for coalition politics to form governments at both local and central levels, and a related almost permanent campaigning atmosphere, helped the Greens and increased the general salience of both energy and environmental issues. According to B/S, in the early 1980's, a green party political competition started. Partly it was the established parties against the Greens, partly it was related to a general scramble for power between SPD and CDU/CSU, with FDP as joker in-between (see e.g. B/C:189-99).

Moreover, the already mentioned media-fuelled "Waldsterben" political uproar in 1981/82 is of course a "catalytic" event, both regarding German domestic politics and its international position on the issue. Among the seemingly worst affected/"acidified" areas was the Bayerische Wald in Bavaria, and Bavaria has been the main CSU base. Hence, there was a regional political aspect pulling in favour of environmental protection.

Third, another "Bavaria/CSU factor" occurred when the CSU took control over the ministries responsible for forests and the environment after 1982. In addition, according to B/C, "the small FDP, their role in German politics threatened by the Greens, controlled the economics ministry which ceased its opposition to acid-emission controls in 1983. Viewed against this background, the policies adopted by the FR Germany take on an air of inevitability"...(108). On the other hand, speaking of regional politics, as indicated, regional government is very strong in Germany, and one may easily envisage the Federal government having problems with establishing and implementing environmental ambitious policies vis-à-vis the Länder (local governments). However, several general and more specific factors seem to have reduced this potential problem. First, there has been an increasing trend for environmental

regulations to fall within the competence of the Federal government as opposed to the individual Länder. In the case of acid rain, among other things a potential domestic "transfrontier" conflict between e.g. coal-producing North Rhine-Westphalia and Bavaria encouraged Federal initiatives, and the industry preferred Federal, more uniform rules. Second, although the Länder are responsible for virtually all of the implementation and enforcement of Federal legislation, according to B/S, the pressures for national uniformity are strong and are encouraged by a common bureaucratic tradition, legal education and the ownership patterns of German industry (B/S:102-104).

*"The role of target groups"*

The role of industry warrants a special comment, being the single most important "target group". German coal-burning electric utilities were not state-owned, and according to B/S, in the early 1980s "were cash-rich, enjoying healthy profits and facing no capital expenditure programs" (p.194). Hence, they were in a vulnerable position when the opinion turned gradually more green. Moreover, the "remarkable" speed with which the FGD retrofit program has been carried out reflects a number of factors: the perceived urgency of the forest damage problem; the availability in the early 1980s of spare industrial capacity which could undertake the massive construction program; and allegedly that many power stations run at relatively low annual utilization rates with annual downtimes for maintenance, providing ample opportunities to retrofit (B/S:200).

*"The role of 'interested thirds': public opinion, NGOs, scientists"*

Turning then to the role of the public opinion and the "green NGO forces", first and foremost, there is of course the more general, cultural German affinity for trees and forests. According to McCormick (1989:128), the "Tannenbaum" of Christmas carols (the Norway spruce) is almost a national symbol. As already indicated, a third of the area of the former FRG is covered by forests. In connection with the "Waldsterben" uproar in 1981/82, forestry farmers and powerful hunting associations in Southern Germany joined the green movement in calls for action. However, as indicated by B/S, there are also other cultural/historic factors which may shed light on the more concerned stance of the German public, for instance compared to the British situation. Hence, a second factor is the need for "undangerous" universal issues which may unite the political left and right; viz. "It is ironical that, in 1982, both Britain and the FR Germany realized extraordinary degrees of national unity over particular issues. For Britain, national unity came from the Falklands war and its echoing of a lost international role. The German endeavour was a massive technological and economic 'fix' aimed at drastically curbing emissions from power stations, industrial chimneys and car exhausts" ... (p.69).



More generally, the green movement has been far stronger in FRG than in the UK, related to the rapidly increasing "Bürgerinitiativen" and eventually the BBU (the Federation of Citizens' Groups for Environmental Protection) in the early 1970s. Also the activity of the green movement culminated in 1983/84 (for an overview, see e.g. Wahl/Sprinz, 1995). Moreover, it should also be noted that senior politicians in Germany were allegedly highly willing to communicate directly with the public about environmental issues, and encourage the perception about certain environmental threats (B/S:113).

The role of scientists has been characterized as ambiguous. On the one hand, German scientists allegedly knew that the early forest surveys lacked scientific validity, "...as < these surveys > simply listed certain poorly understood effects in a rather imprecise manner" (B/S:190). On the other hand, the German scientific community supported the precautionary approach, and did not come out in opposition to new control measures.

As far as I can see, the "personal factors" perspective à la the "Thatcher style" is less relevant in this case.

#### *4.3.5. Some special NO<sub>x</sub> comments*

As the story so far has been very much focused on the "sulfur successes", some special comments to the more ambiguous NO<sub>x</sub>/transport story seem warranted. According to B/S, the car industry adopted successful delaying tactics by demanding a European solution (see below). More specifically, the voluntary emission control measures which the government has been able to adopt under EC rules may be insufficient, as overall road traffic has been growing; the replacement rates of old cars have remained low; and heavy vehicles have remained uncontrolled (p.201). Hence, the 30% declaration target seems out of reach. However: several economic incentives to retrofit/buy cleaner cars and petrol were introduced in the late 1980s. As among other things the number of low emission cars *has* increased a bit, the protocol stabilization target has quite easily been reached.

#### *4.3.6. The role of international factors*

As already stated, the basic interest profile of Germany indicates a couple of assumed prime motivations for German interplay with its international environment. First, "importing" around 50% of its air pollution from its neighbours, Germany could not deal with its pollution problems unilaterally. Making others reduce their emissions was quite important. In this connection, the EC framework alone was insufficient, as the FRG had some very "dirty" Eastern neighbours...Moreover, as the ambitious domestically driven abatement program outlined above took form, the international, economic competitive dimension of course grew stronger. Several German political bodies argued that the government should attempt to

"spread the misery" of stringent domestic policies to other European partners in order to protect German industry against a potential loss of competitiveness (B/S:203). Hence, after the "green turn" of 1982 and the strong domestic policies established, both the EC and LRTAP must probably be seen more as an arena for exerting influence on Western and Eastern neighbours than as international regulatory constraints on domestic policies. The EC results have been characterized as a moderate success. For instance, although the LCP Directive has been modelled very much on German legislation, the final result was a much watered-down compromise. The German efforts have been characterized as more successful in the field of European vehicle emissions regulation (B/S, e.g. 203).

Much more could of course be said about the EC and LRTAP processes, but the main lines of conflict and outcomes have already been described in the UK case study.

#### *4.3.7. Concluding comments*

*"Summing up"*

*FIRST, WHY A "PROCESS PUSHER" FROM 1982 ON?*

Some important aspects:

The "focal point" must be the "Waldsterben" crisis in 1981/82, which was the main stimulant for a major domestic air pollution abatement program. The establishment, design and implementation of this program was facilitated by several "benign" societal factors :

The quite prominent place of regulatory principles like the "Vorsorge/precautionary" principle reduced the weight of scientific uncertainty;

The importance of "Waldsterben" was amplified by German cultural forest affinity and a general greening of the public opinion from the early 1970s on;

Regional politics and party politics (involving the rise of the Greens) ensured a "favourable" leadership in the most important ministries in the crucial early 1980s;

The private industrial "target groups" were economically successful and perceived as "able to pay";

Governmental awareness of and interest in technological abatement opportunities, and the more long-term competitive advantages inherent in early application of advanced technology, were beneficial factors for regulatory initiatives.

## *SECOND, WHY A HIGH LRTAP COMPLIER UP TO 1990/91?*

Some important aspects :

In a cost-benefit perspective: although damage reductions and hence "benefits" became somewhat more uncertain from the mid 1980s on (as the causes of forest damages got more complicated), the specific implementation costs were close to zero, due to the program(s) referred to above;

The German LRTAP NO<sub>x</sub> performance was very much of an externality of EC policy processes, which again were rooted in German policy initiatives related to the wider 1982/83 abatement program.

### *"Some further comments to the knowledge situation"*

Also in this case, there seem to be few actual conflictual implementation assessments so far. In fact, a main comment seems to be that we know quite a lot with regard to wider, "initial" factors in the late 1970s and early 1980s, but far less about the actual policy and implementation processes after 1985 and 1988. E.g. Wahl/Sprinz refer only to the various legislation originally adopted in the early 1980s in order to account for FRG's fulfilment of the 1988 NO<sub>x</sub> protocol. It may very well be that German implementation is more of a straight-forward phenomenon than in many other more "unruly" societies, but this remains very much of an open question. But it is of course also the case that it is harder to get a grip on processes that are very close in time and perhaps still on-going. Still, my impression is that we still lack some basic *implementation* knowledge in the German case.

More generally, with regard to the access perspective, the challenge also related to Germany would be more a matter of piecing together existing information and doing some limited interviewing, partly with some key authors, than having to dig up very much new material.

## **4.4. The Dutch story: "process broker" and "solid complier"...**

### *4.4.1. A rough overview of the knowledge situation*

As far as I know, much less has been written about the Dutch acid rain policies than the two important states discussed so far. Dutch policies have been more generally commented upon by Levy (1993). This summary is mainly based on Raadschelders (1994); Dinkelman et.al. (1994); and Liefferink (1995).

### *4.4.2. The LRTAP compliance picture to be explained.*

In the LRTAP protocol negotiations, the impression is that the Netherlands has functioned much as a generally positive country (e.g. a 40% member of the 1984 "30%" sulfur club), but not a very significant "pusher"; tending rather to play its general role of a middle-country "process broker".

With regard to the sulfur process, the Netherlands ended up as a solid complier, having reduced emissions with approx. 66% by 1993.

The NO<sub>x</sub> stabilization target has also been reached, as emissions were reduced with 5% by 1993. Hence, the Dutch and for instance Norwegian performance so far is quite similar. However, in relation to the 30% declaration target, progress is not very impressive. For what it is worth, the projected reductions by the year 2000 (the declaration target date is 1998) are of the order of 60%.

Let us then turn to the background for this quite solid performance.

#### ***4.4.3. The "national interests" perspective.***

Point of departure: according to the LRTAP 1994 review, the amount of SO<sub>2</sub> emitted in 1980 was 490 000 tons - three times as much as for instance Norway, but only around 15% of the German figure. So far, I have not come across statistics showing the relative contribution of power plants in relation to for instance various industrial combustion processes. With regard to the Dutch sulfur and nitrogen "export-import" balance, around 80% of the emissions is "exported", and roughly the same amount is "imported" (Lieverink, 1995:70). Hence, the overall situation is roughly similar to that of Germany.

Let us then discuss the cost-benefit picture, as imaginably assessed by the government. On the basis of Raadschelders (1994), it seems reasonable to assume that the government came to see economic benefits as higher than economic compliance costs. Regarding these "issue-specific" costs, they were economically not very significant, due to changes in energy policies undertaken for other reasons. The keyword is natural gas. The Groningen natural gas field was discovered in 1959, and a gradual conversion to natural gas became possible. Towards the mid-1970s, almost 90% of electricity was produced with natural gas as a fuel (Dinkelman et.al., 1994). The oil crisis in 1973-74 infused "negative" political energy into this process, as a gas-rationing policy was developed, related to a wider EC process. As a result of this, the government did not renew the contract with the gas producers in 1978. Partly due to financial problems in the early 1980s and the Dutch government missing the natural gas income, a new contract with the power stations was undertaken, and the conversion process was "back on track". Hence, in 1985, the use of fuel oil for electricity generation was only a fifth of the total fuel package compared to the figures from 1981 (Raadschelders, 1994:6).

However: Raadschelders indicates that the Dutch government and the provinces also carried out some more directly "environmental" reduction measures in the 1970s, by lowering the sulfur content of heavy fuel and strengthening emission standards for oil and coal more generally. But according to Dinkelman et.al. (1994:35), Dutch abatement policy was based on the strategy that oil refineries and energy intensive industries - sectors that produced for international markets - should be spared as much as possible.

With regard to perceived reductions in environmental damage costs, this factor increased in importance related to a rapidly changing more serious picture of acid rain damages towards the mid-1980s. According to Raadschelders, problems of air pollution and smog had been on the agenda since the late 1950s (p.6). But as noted by Liefferink, policies were mainly directed at the local, urban environment (p.74). As late as 1982, effects of acidification were reported in Dutch soils poor in calcium, but "as a whole the situation was not seen as alarming" (Liefferink, 1995:75). However, both Raadschelders and Liefferink indicate some kind of a turning point around 1983/84, as "events in Germany and the actions taken by the German government were extremely influential in the Netherlands" (Raadschelders, 1994). In 1984, the Central Forest Service published a report which stated that between 20 and 40% of the Dutch forests were affected by acid rain (Raadschelders, 1994:4).

Moreover, it is also indicated that a strong Dutch sulfur policy was seen as "cooperatively" beneficial, as the Netherlands was an importer of SO<sub>2</sub> and dependent on others' reductions for optimal improvements.

#### ***4.4.4. The "domestic politics" perspective***

Briefly setting the stage, among the most important social actors in this connection have been the Ministry of Housing, Physical Planning and the Environment (VROM), established in connection with the Air Pollution Act in 1970; the Ministry of Economic Affairs; the Ministry of Agriculture, Natural Resources and Fisheries; and the provinces. With regard to the governmental structure, it should be noted that the national government had no legal authority to set emissions standards until 1981; this was done by the provinces - in consultation however with the government.

According to Raadschelders, the Dutch sulfur story is one characterized by little social conflict: "There appears to be no record or memory of fierce competition, negotiation and reluctant acceptance of measures. There were certainly distinct positions, but the extreme standpoints that one may expect from such diverse actors as environmental interest groups and oil refining industries were mediated by the position of the government which was strong and united" (p.15). Why such "social harmony"? The availability of natural gas, which has represented a clean and profitable alternative to coal and fuel oil, is probably *the* most

important factor. However, Raadschelders also points to the early seizure of the issue by the government and the strong support for action within the government. She indicates that this early "activism" may have something to do with the upholding of a generally green reputation and related influential position in regional and international environmental politics (p.16).

With regard to "regulatory philosophies", the section above points towards a "consensual" model. Several factors bolster such a thesis. Generally, the political culture in the Netherlands has been characterized as a "consensus and consultation" culture, which is "as old the Netherlands itself" (Dinkelman et.al., 1994:3). A specific example is the composition of the advisory "Central Council for Environmental Hygiene" (CRMH). This council included both the Electricity Generating Board (SEP) and the Foundation for Nature and the Environment. Another example is the "voluntary agreements" approach. In 1990, a voluntary emissions reductions agreement between the national government, the provinces and the Electricity Generating Board (SEP) was established. Targets were included, but SEP could determine how emissions reductions were to be achieved. This approach has seemingly been successful; energy producers agreed to 85% reductions, but have achieved over 90% (Raadschelders, 1994:10).

Winding up this section, it should be repeated, however, that this is only a brief glimpse of the *sulfur* process. Based on the other case studies summed up in this report, my guess is that the NO<sub>x</sub> domestic politics story is somewhat more "controversial"...

#### **4.4.5. International factors**

With regard to international factors, as indicated above, Raadschelders emphasizes first and foremost the role of Germany. According to Dinkelman et.al. (1994:15), acidification became an issue in the Netherlands some months after the Spiegel article on "Waldsterben" in 1981; "till that time Dutch air pollution policy was based on health problems and short term transport of air pollution".

The exact role of LRTAP seems to be somewhat disputed. Raadschelders states that "the Dutch case of implementing an SO<sub>2</sub> emission policy can be presented with virtually no mention of the international environmental agreements" (p.13). Levy (1993) states that "All of the governments - <among them the Netherlands, JW> - were active in <LRTAP> collaborative programs, even though their official positions, initially, were that acidification was not a problem. Once these governments became aware of the extent of damage their countries suffered, they adopted positions favoring reductions in emissions" (p.121). However, also Raadschelders' interviewees stated that LRTAP was important (especially the exchange of data on depositions), but still: only secondarily so (p.13). According to her, the Dutch were ahead of the international agreements with more stringent measures, and the

international goals were already in force in the Netherlands. Moreover, as indicated above, the "setting a good example" argument was clearly a part of the Dutch policy, but it is highly unclear if this aspect has been strong enough to lead to a similar compliance record in a more "malign" energy policy situation.

#### ***4.4.6. Summing up***

There seems to be not very much written on Dutch LRTAP implementation processes; available information focuses first and foremost on the sulfur process. Based on scattered evidence available so far, how account for the solid sulfur compliance record? Some important points: first, "specific" costs of achieving the 30% target were low or possibly non-existent, as substantial reductions in relation to 1980 levels had been achieved already in 1985. The use of natural gas, which was more generally financially motivated, was a key factor in this picture. But there was also a more general policy drive with regard to the establishment of sulfur reduction measures. This process seems to have been more "externally" oriented than "internally" driven, as a high degree of domestic environmental consensus seems to have existed. Important motivations seem to have been the need for setting a good example and influencing others, as much air pollution was "imported", and generally strengthening the Dutch "regional environmental (super)power" ambitions.

### **4.5. The Norwegian story: a strong, initial "process pusher" getting into trouble...**

#### ***4.5.1. A rough overview of the knowledge situation***

With regard to LRTAP implementation knowledge, the Norwegian situation is more similar to the "scarce" Dutch situation than the two other (and in several ways more important) countries in this report. Hence, this section is mainly based on Laugen (1995), supplemented by Stenstadvold (1991) and various material published by the Norwegian environmental authorities

#### ***4.5.2. The LRTAP compliance picture to be explained.***

With regard to Norway's negotiating positions and role in the two main processes focused here, much of course related to its position as a clear "net importer" of pollution and with vulnerable soil characteristics, Norway was a strong pusher in the process leading up to the 1979 Convention and the ensuing sulfur regulation process. Initially a proponent also for a NO<sub>x</sub> agreement, over time, Norway's role became more low-key and hesitant, due to an increasing awareness of the costs and complications related to abatement efforts in this field.

Within the sulfur process, Norway has ended up as a very solid complier, having reduced its emissions with approx. 74% by 1993.

The NO<sub>x</sub> stabilization target has also been reached, as emissions were reduced with around 5% by 1993. However, as in the Dutch case, in relation to the 30% declaration target, progress is not very impressive. Moreover, the Minister of Environment has on several occasions indicated that the target may be unattainable.

With regard to the more recent VOC protocol, Norway has chosen 1989 as base year for the 30% reduction and has exempted the area north of the 62nd parallel. VOC emissions have not been reduced so far; in fact, such emissions had increased 12% by 1993. However, it should of course be kept in mind that the target year is 1999.

#### *4.5.3. The "national interests" perspective.*

Point of departure: according to the LRTAP 1994 review, the amount of SO<sub>2</sub> emitted in 1980 was 142 000 tons, e.g. a little more than Switzerland, but more than three times less than Sweden. Moreover, the amount of NO<sub>x</sub> emitted in 1987 was 237 000 tonnes. With regard to the relative contribution of the various societal sectors in the case of sulfur, 1990 figures indicate that industrial processes accounted for 56%, combustion for energy purposes 23% and mobile sources 22%. In the case of NO<sub>x</sub>, the figures are: mobile sources 37%, various sea transport and mobile rigs 35%, and combustion for energy purposes and industrial processes 23%. Regarding the Norwegian sulfur and nitrogen "export-import" balance, Norway is of course a large net importer of air pollution, with as much as 95% of total SO<sub>2</sub> fallout and 86% of total NO<sub>x</sub> fallout imported.

As can be recalled, within the sulfur context, Norway is a very solid complier, ending up with emission reductions more than double the requirements in the 1985 protocol. What is the background, then, for this solid record?

Turning first to the "interest-based" explanatory perspective, the governmental cost-benefit calculations in this case seem quite unambiguous. With regard to costs, it seems reasonable to distinguish between "pure" domestic abatement costs and the international, competitive effects related to the domestic efforts. According to Laugen (1995), the abatement costs directly related to the question of compliance were close to zero. The 30% reduction was already achieved at the signing of the 1985 protocol. This was primarily due to reductions achieved in connection with an industrial clean-up program initiated back in 1974, motivated by local air pollution. In addition, some of the reduced emissions from industry came about due to a general recession period and closing down of factories. There have of course been abatement costs related to the "extra" abatement, but they were probably not very high. For



instance, the closing of the copper mines in Sulitjelma came after the mines had been highly unprofitable and dependent on government subsidies for years. Moreover, 40% of the 1980-93 reduction was related to decreasing consumption of heavy crude oil on land. This decreasing consumption came about due to a complex interplay between new developments in refining technology and governmental regulation. In addition, as some of the emissions reductions witnessed *have* been related to industrial regulation (how much exactly is hard to say, but around 20% can be indicated), there was a moderate international competitive dimension present.

Turning to benefits, as indicated earlier, I find it reasonable to distinguish between, on the one hand, reductions in environmental damage costs, and on the other hand, strengthening of the international "green" reputation. With regard to the more general question of damage costs related to acidification, they have been related to fresh-water fishing effects, forest damage, damages to human health, and corrosion. For instance yearly loss due to acidification of watercourses has been estimated to be around 600 million Norwegian kroner (Laugen, 1995:28). However, with regard to *reductions* in environmental damage costs related to domestic abatement, these were of course quite marginal - given that around 95% of SO<sub>2</sub> fall-out came from foreign sources. Hence, the bulk of the benefits related to own, solid reduction performance must be assumed to have been related to a strengthening of Norway's position internationally to call upon others to reduce their emissions.

On the whole, a picture emerges of a sulfur calculus where the decisive factors were more low costs than certain, high benefits.

So far the sulfur picture. What about the NO<sub>x</sub> picture, then? Well, here the situation was quite different. No specific measures had been introduced before signing of the protocol, and emissions were increasing. Abatement costs were bound to be substantial, not least in relation to the 30% Declaration target. This has in recent years been demonstrated amply by the intra-bureaucratic controversy and delays related to the nitrogen and CO<sub>2</sub> abatement policy package (come back to that). The measures that have been implemented are requirements on exhaust gas from all types of vehicles, and industrial measures related to fertilizer production in the Grenland area. Other processes and measures which have contributed to the Norwegian NO<sub>x</sub> performance are reduced production in the ferroalloy industry and reduced flaring in the North Sea (SFT - "Emissions to Air in Norway", 1993:7).

The NO<sub>x</sub> damage side picture does not deviate very much from the sulfur picture (although NO<sub>x</sub> is not an entirely harmful substance). Moreover, much like in the case of sulfur, regarding *reductions* in environmental damage costs related to domestic abatement, these were quite marginal - given that around 85% of NO<sub>x</sub> fall-out came from foreign sources. Hence, also in this case, the bulk of the benefits related to own substantial reduction performance,

must be assumed to have been related to a possible strengthening of Norway's position internationally to call upon others to reduce their emissions.

On the whole, a picture emerges of a NO<sub>x</sub> calculus with quite substantial abatement costs on the one side - if significant emissions reductions were to take place; and somewhat uncertain benefits on the other side - benefits highly dependent on international action.

#### **4.5.4. *The "domestic politics" perspective.***

##### *"The sulfur picture"*

Regarding relevant actors, a first thing to note is the seemingly very centralized decision-making process related to the sulfur protocol. Preparations and negotiations were almost entirely in the hands of the ministry of environment (and with a centralized intra-ministerial process also.), in collaboration with a group of natural scientists. Other ministries were mainly informed about the course of the negotiations.

With regard to regulatory aspects/philosophies, the Norwegian approach is on the one hand a quite centralized one, with regulation of industrial emissions by individual concessions decided upon by the Norwegian Pollution Control Authority (SFT). This has been supplemented by a financial assistance program initiated in 1975 ("Measures against pollution", St.meld.nr.44 (1975-76)).

On the other hand, there is also a tradition of close cooperation between the governmental authorities and their respective societal sectors (Laugen, *ibid.*:69).

Turning to the question of the inter-governmental/inter-ministerial power balance, as indicated above, the process was from the beginning a very centralized and "narrow" one, very much dominated by the Ministry of Environment. The lack of interest and intervention from other ministries is of course related to the lack of obvious new "specific" costs related to the implementation of the 1985 protocol. For instance industrial air pollution regulation had started long before the protocol and developed according to its already established logic.

With regard to the role of target groups, industry representatives were sceptical, but in the end quite indifferent, due to state funding programs related to the aforementioned on-going more general industrial clean-up program (Laugen, 1994:42).

Regarding the role of "interested thirds", first, the role of scientists was initially controversial, related to the controversy surrounding the "Acid Rain's Effects on Forests and Fish" research project (Roll Hansen, 1986). However, this was sorted out, and a good working relationship between researchers and environmental authorities was established from

the early 1980s on. Second, the role of NGOs and the wider public opinion had a distinct centrally governed flavour to it. For instance an Information Group Against Acid Rain was established in 1982 as a joint project between five NGOs, receiving most of its financing from the Ministry of Environment (Laugen, 1995:41).

In sum, although the domestic politics story provides nuances and analytical richness, the basic story in this context is the one provided by the "national interests" perspective - very much shaping the form of the domestic politics process.

*"Is NO<sub>x</sub> different?"*

The NO<sub>x</sub> issue is of course different in several respects. As already indicated, the Norwegian initial "pusher" position changed during the protocol negotiations into a more moderate, middle-ground position (Stenstadvold, 1991). This change was due to a recognition of a more complicated domestic emissions situation than initially assumed, with among other things higher shipping emissions than initially realized. Hence, the Norwegian Labour government only reluctantly joined the smaller group of countries signing the 30% declaration, probably pressured by a domestic party-political green contest with regard to reduction targets (with the agricultural Center Party going for a 75% NO<sub>x</sub> reduction by the year 2000...), and a general surge in the public's interest in green issues at the time (Laugen, 1995:42-43). But it had become clear already during the protocol negotiations that fulfilling the 30% target would necessarily mean new and probably costly policy measures.

Related to the talk of new and costly abatement measures, and of course also to some extent given by the more complex NO<sub>x</sub> emission picture, new and other ministerial actors were drawn to this process compared to the sulfur process.

In the first major process aiming for a plan to achieve the 30% target (up to October 1991), important potential implementing agencies like the Ministries of Transport and Energy and the Directorate of Shipping and Navigation were involved, in addition to the Ministry of Environment. In the second major process, an interministerial committee has been at work, consisting of the ministries of Environment, Finance, Foreign Affairs, Agriculture, Transport and Communication, Industry and Energy. The seemingly complicated committee work has been aptly described by Laugen (1995): "On one hand the Ministry of Environment has argued that Norway needs to fulfil its international obligations in order to legitimately expect the same from others. On the other hand, the Ministry of Finance has resisted more government spendings, the Ministry of Transport has resisted measures to reduce traffic, the Ministry of Energy has resisted measures towards oil-production and the Directorate of Shipping has resisted regulation of coastal traffic" (p.50). The committee work has finally

been finished (St.meld.41 (1994-95)), and the plan contains few new regulatory initiatives. Emissions are expected to be reduced 8% by the year 2000.

Hence, as indicated above, target groups have indirectly and directly become involved in the process in a quite different and more active manner than the sulfur process. This has of course to do with the fact that mobile sources are not covered by Pollution Control Act, hence leaving the various ministries in charge of possible measures within their sectors, and the Ministry of Environment in a difficult brokering and coordinating role.

With regard to the role of NGOs and the media, they have also become more interested in this bureaucratic infighting and followed the process critically. However, one cannot say that this has been a major issue in public debate, and interest in environmental issues has generally decreased towards the mid-1990s. The green party-political contest of the target-formulating mid/late 1980s is long gone...

In sum, is then this higher degree of implementation complexity - with far more actors involved than in the case of SO<sub>2</sub> - the main explanation for comparatively much lower NO<sub>x</sub> implementation "effectiveness" (although formal compliance has been achieved)? Some coordination problems and internal conflicts seem to have existed, but the keyword seems to be costs - and a situation where costs will fall on fairly specific target groups which are both powerful and exposed to tough international competition (cf. shipping), and benefits are widely dispersed.

#### *4.5.5. The question of international factors.*

Turning to the question of international factors, first, it seems reasonable to assume that the regime had virtually nothing to do with formal SO<sub>2</sub> compliance; the achievement of the 30% reduction was seemingly related to domestic processes with their roots years before even the 1979 Convention. However, the existence of the regime as a channel and forum for persuasion and pressure may contribute to explaining the degree of "over-compliance". In other words, the better one did domestically, the louder one could call for others to follow suit. Moreover, other aspects point clearly in the direction of LRTAP as an important international *instrument* for Norwegian/Scandinavian persuasion and pressure. This is first and foremost related to knowledge development; Norway needed to bolster both long-distance transportation and related domestic damage theses. The EMEP program (Cooperative Program for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe) played a crucial role in the transportation debate. This program was initiated by the OECD in the late 1970s, and expanded within the LRTAP framework (as mentioned, a specific EMEP/LRTAP protocol was signed in 1984). As indicated by Laugen, most Western European countries were sceptical of the Scandinavian claim that their countries caused

damage far away from the sources, but by the early 1980's the scientific evidence was compelling, and this part of the debate was more or less over. With regard to domestic damage research, Norwegian participation in LRTAP working groups may have been helpful, and LRTAP functioned as a forum for presenting results (Laugen, 1995:62).

However, the NO<sub>x</sub> story indicates the limited power of international commitments when the going gets tough. True, the need to preserve a Norwegian green reputation within LRTAP may have played a role for the acceptance of the 30% NO<sub>x</sub> declaration target (although the declaration is not formally a part of the LRTAP system). This aspect may also have influenced the general level of governmental attention given to NO<sub>x</sub>-reducing measures - even if this attention has had limited practical results so far. Moreover, as far as I can see, it is somewhat uncertain whether Norway would have stabilized its NO<sub>x</sub> emissions without the NO<sub>x</sub>-protocol and its "green" LRTAP reputation in the background - given increasing emissions (and "increase" predictions) in the years before the protocol, and its "large NO<sub>x</sub> importer" geographical position. However: there is no doubt that domestic forces and processes are the main explanatory factors for the NO<sub>x</sub> implementation story so far.

Summing up: as indicated by Laugen (1995), Norwegian LRTAP-related SO<sub>2</sub> politics is definitely not a reluctant compliance story, but much better described as an active strategy towards creating international agreements and influencing important "exporter" states through knowledge and the setting of a good example. Hence, LRTAP may have played a certain role for the degree of over-compliance witnessed. But as indicated earlier, much was clearly achieved by "coincidental" processes and measures with a purely domestic background. The need to preserve a Norwegian green reputation within LRTAP may also have played a role for the acceptance of the 30% NO<sub>x</sub> declaration target. However, the NO<sub>x</sub> story indicates the limited power of international commitments when implementation gets economically and politically costly.

#### *4.5.6. Concluding comments.*

How, then, account for the sulfur "over-compliance" and the comparatively much lower NO<sub>x</sub> implementation "effectiveness" (although formal compliance has been achieved)?

In the case of sulfur, compliance with the 30% reduction requirement was achieved already when Norway signed the protocol, and much of the further emissions reductions have been caused by more or less coincidental, "non-environmental" processes like the closing of unprofitable copper mines and developments in refining technology. Some of this over-compliance may have been inspired by a wish to boost Norway's international "pusher" position, but most of the reductions would probably have taken place anyway.

The NO<sub>x</sub> situation is quite different, as no measures had been undertaken before the signing of the international commitments. Moreover, the more diffuse and complex (and definitely economically important) transport and shipping sectors were important "target sectors", and substantial emissions reductions would be costly. Weak regulatory powers left the Ministry of Environment in a complicated and protracted bargaining situation with the other sector agencies, in which it has not had much success so far. As the stabilization and minor emissions reductions achieved so far have been caused by measures primarily motivated by local pollution problems, the impact of international commitments has not been very marked. But it is questionable if the intra-bureaucratic battle would have been started at all if the various international NO<sub>x</sub> commitments had not been established.

Overall: thanks to Laugen's (1995) work, we know a great deal about Norwegian implementation processes. However, among other things, the intriguing NO<sub>x</sub> bureaucratic infighting lies very much in the dark.

## 5. Focusing in on the Importance of Regime Design

### 5.1. The perspective introduced

In this section, I turn the country-specific, "individualistic" and "bottom-up" perspective more or less around and adopt a more international, "holistic" and "top-down" perspective. In other words, from being a member of the "explanatory choir", the regime moves centre stage. Given the case study information specifically focused here and other empirical material, what do we know about the importance of the various aspects of the LRTAP regime design? It is of course debatable what constitutes the most important elements in the design of international regimes. My list is based on work within the "Oslo/Seattle" effectiveness project, and the background for it further discussed in Andresen/Skjærseth/Wettestad (1995) and Wettestad (1995 A). Basically, I suggest to distinguish between "structural" and "regulative" aspects of regimes. Six structural factors may be discerned: participation/access; the role of the agenda; decision-making rules; the role of the secretariat; the organization of the scientific-political complex; verification and compliance mechanisms. Regulative aspects may be discussed on the background of keywords such as "legal status", "specificity" and "differentiation". In addition to the structural and regulative regime perspectives, there is also a more "diffuse" regime perspective, highlighting the confidence-building effect of cooperation over time, and perhaps not related to any specific design element of regimes. I will come back to that.

### 5.2. The "structural" regime perspective

#### 5.2.1. *Access and participation: an open process of "mutual education"?*

##### *"Conceptual background"*

I would argue that at least three different dimensions/"faces" of regime participation are discernible: state access/"scope"; "outsiders' access"; and "level". With the term scope, I am referring to the question of whether the regime is global, regional or bilateral with regard to state participation. An important suggested perspective here: in order to achieve problem-solving effectiveness, participatory scope should match problem scope quite closely. For instance, an "OECD climate regime" would not at all be insignificant, but we know that (especially over time) Third World — and global — participation will be crucial in order to deal with the greenhouse problem. But flexibility may also be important: especially in comprehensive/global settings, it seems obviously reasonable, in certain phases and related to certain more limited problems within a larger whole, to temporarily limit participation and conduct work in smaller groups, perhaps shielded from public attention.

Access for outsiders has to do with the rules regulating the participation of actors "outside" the formal regime parties: observers from other regimes/organizations, private-sector organizations, environmental NGOs etc.

A general assumption here may be that open access, practised however with some flexibility (as general openness in negotiations can also easily lead to "play for gallery" etc.), is an effective approach.

The level aspect of regimes has to do with the extent to which important regime meetings are dominated by ministers/politicians or administrators/bureaucrats. A general assumption may be that regular "high level"/political gatherings can contribute sorely-needed political energy into regime negotiation processes, given the existence of continuous bureaucratic "footwork" and follow-up".

### *"The LRTAP picture so far"*

As a general comment, not surprisingly, most attention in the literature so far has been given to the question of outsiders' access.

But let us first turn to the question of *state participation*. There seem to be some differences in "coverage" between the protocols. For instance, the 1985 sulfur protocol has had 21 Parties, with among others the US and the UK as non-parties; while the 1988 NO<sub>x</sub> protocol has had 25 Parties, including both the US and the UK. The new sulfur protocol has been signed by 28 Parties. These differences may have influenced and at least may influence problem-solving effectiveness somewhat, as it means an improving match between problem-creating activities and international mitigatory measures over time. This is especially related to the fact that important emitters like the UK and Poland are now members of the new sulfur protocol. However, with regard to "political" effectiveness, they are of questionable importance. All groups are probably too large to develop a very strong "diffuse" reciprocity, but this "cooperative culture" question has not been systematically addressed so far.

With regard to the question of "*outsiders' access*", this question has so far only been quite generally commented upon. Regarding the LRTAP formal access structure, the 1979 Protocol only contained a very general formulation in article 10, saying that the Executive Body could "when it deems appropriate, also make use of information from other relevant international organizations". In practice, LRTAP meetings have been open to IGOs, industrial groups and environmental NGOs. In contrast to e.g. the North Sea cooperation, also working group meetings are open to NGOs - as long as they have "consultative status" with the ECE. The NGOs are allowed to participate in discussions, but rarely do that. The only "closed" fora within the LRTAP regime are the Heads of Delegations meetings in negotiation processes (Nordberg, LRTAP secr., May 1995).



Hence, what has been coined a LRTAP process of "mutual education" (Sand, 1990:256) has meant the participation of IGOs like the World Meteorological Organization (Nordberg: important), World Health Organization (Nordberg: more important over time), UNEP and FAO (Nordberg: seldom), OECD, and the International Energy Agency. With regard to industrial groups, we have groups such as CONCAWE (Oil Companies European Organization for Environmental and Health Protection). Turning finally to NGOs, active participants have been the British branches of Greenpeace and Friends of the Earth; the International Union for the Conservation of Nature; the International Council on Environmental Law; and not least the International Institute for Applied Systems Analysis (IIASA).

Hence, we have a pretty good picture of *who* has participated at the international level more generally. Less is clear with regard to patterns in the specific processes and development over time: does "inclusiveness" vary between the different processes? Has "inclusiveness" increased over time, and with any effects? And far less is known about the *specific effects/impact* of this participation on negotiation outcomes and implementation processes. Levy (ibid.) generally states that "except for IIASA, none of these groups have much influence over LRTAP decision-making. The influence of NGOs comes mainly via activities inside countries, usually publicizing governmental action within LRTAP". This might very well be so, but we need to substantiate this assessment with data both from the international and national level.

Regarding the *level of proceedings*, first, due to the reoccurring protocol negotiations at quite regular intervals (around 3-4 years), LRTAP cooperation has been marked by interplay between bureaucratic/more low profile and political/high profile processes. However, it may be suggested that the LRTAP process was perhaps infused with somewhat more "political energy" in the early phases of the cooperative process than in the more recent phases, due to closely related high level meetings like the Stockholm Conferences in 1982 and the Munich and Ottawa meetings in 1984.

### **5.2.2. *Decision-making rules - is consensus better than its reputation?***

#### *"Conceptual background"*

As a general point of departure, it seems here reasonable to assume that majority-voting is a stronger decision-making rule than consensus. The case for majority voting is well known, but let us repeat the main logic. In situations where decision-rules demand unanimity, a single "laggard" state may be able to hinder a vast majority of states agreeing to a regulation. Moreover, it has been suggested that "vetoing", i.e. finding flaws (for instance costs falling on specific groups and in the near future) related to international regulations, is far easier in

international cooperation than "engineering", i.e. convincingly portraying the (often diffuse and long-term) benefits related to such regulations (Underdal, 1989, 1990). Thus, the decision-rule of unanimity does in a way "structurally" favour the "laggards". Any institutional ability to go beyond this "laggards logic" must surely be assumed to enhance problem-solving capacity.

### *"The LRTAP picture"*

Turning to LRTAP, as a general comment, I have not seen any discussions of this aspect of LRTAP decision-making, so the following are my own reflections.

Point of departure: article 12 in the 1979 Convention stated that amendments to the Convention should be adopted by consensus, and enter into force "for the Contracting Parties which have accepted it on the ninetieth day after the date on which two-thirds of the Contracting Parties have deposited their instruments of acceptance with the depositary". Hence, the basic decision rule also within this regime has been unanimity. The immediate reflection is that this obviously has reduced the "strength" of the outputs and hence the course of the cooperation. But this question is perhaps not as obvious as it may seem at first glance. First, it is questionable if there in *any* of the negotiation processes carried out so far has been a majority for a much stronger output. To my knowledge, for instance in connection with the 1985 sulfur negotiations, there were never any serious discussions of a 50 or 60 percent cut. In fact, I have never heard of anything other than the 30% suggestion in connection with these negotiations. Regarding the NO<sub>x</sub> negotiations, there was a "splinter" group forming the 30% declaratory cut, but I doubt whether it would have been possible to get a majority behind a legally binding protocol on 30% NO<sub>x</sub> cuts. I do not think for instance that Norway would have signed such a protocol. Related to all this is also, second, the possibility of establishing protocols without the consent of all Convention Parties. Hence, the consensus requirement has been practised with some flexibility. For instance in connection with the establishment of the 1985 sulfur protocol, the majority of the Parties secured a formal acceptance from the "outsider" UK. Third, it is generally questionable whether majority-voting rules are implemented as carefully as consensus decisions. However, this is a subject which can be pursued empirically first and foremost within the European Union context.

### **5.2.3. *The role of the secretariat: stage-hand or actor?***

#### *"Conceptual background"*

As noted by Sandford (1992, 1994), available literature on secretariats focuses mainly on the U.N. Secretary-General in international negotiations and crises of various kinds. Other secretariats, such as those related to international environmental regimes, have hitherto

received far more scattered attention. As far as I can see, the most focused analytical distinction in the literature on secretariats so far is the distinction between "active"/"maximalist" and "passive"/"minimalist"/stage-hand secretariats (see for instance Young, 1967). For instance, regarding agenda-setting, the "activist" secretariat initiates and actively participates in agenda setting and protocol development. The "passive" secretariat acts more as a behind-the-scenes adviser on agenda. In the negotiation stage, the "activist" secretariat consults with the parties about negotiation requirements, facilitates, and in some cases initiates, the development of parallel or single negotiating texts. It is also available to act as moderator or mediator in the case of negotiation stalemates. A "passive" secretariat does not participate directly in the negotiations, instead it provides administrative assistance to the parties in document preparation as requested (Sandford, 1992).

It may be argued that the other main interesting dimension to scrutinize further is the question of "resources", in terms of budgetary resources and manpower. In my view, there is no logical necessity for an active secretariat to be a large secretariat — or the other way around. It might very well be that the "optimal" combination is a rather small secretariat (not drawing on more than "necessary" of the Parties' resources), being "active" and efficient. But this of course also has to do with the Parties' own administrative resources: the weaker these are, the stronger the assumed need for the international secretariat's resources.

#### *"The LRTAP picture"*

As a general comment, the role and strength of the LRTAP secretariat have for instance been commented upon by Wettstad (1991) and Levy (1993).

Compared to other international regimes with "their own" administrative units, like for instance the PARCON secretariat, the LRTAP secretariat is a somewhat different formal creature. LRTAP secretariat functions have been provided by the Air Pollution Section of the ECE's Environment and Human Settlements Division. Hence, LRTAP secretarial functions were added to an existing institution's agenda. In terms of resources, the LRTAP secretarial staff has been characterized as "small, overworked and underfunded" (Levy, 1993:84). The Air Pollution Unit has for a long time had five professional staff members, with two support staff members. Perhaps even more than many other international environmental regimes, the LRTAP secretariat is weak by design. The reluctance of the Parties with regard to giving the regime organizational clout was symbolized by the unwillingness in 1983 to allocate resources to uphold the one post financed so far by UNEP. The argumentation was formal: article 11 of the Convention requested the Executive Secretary of *ECE* to carry out secretarial functions - and so be it...<sup>14</sup> Allegedly, the secretariat has little or no time for even very modest

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14 See Gehring (1994), p.138.

entrepreneurial initiatives. Regarding the states' reports, a consciously passive role on behalf of the secretariat has been indicated, in order not to embarrass the Parties. For instance, no effort has been made to fill in missing information or to correct misleading information in the reports (Levy 1993:91). Moreover, given for instance the fact that the scientific-political complex to serve is definitely comparatively quite complex, this contributes to making a passive role highly understandable. Moreover, the LRTAP secretarial resource situation seems to have developed even more unfavourably over the years, as new protocols and processes have gradually been added to the workload.

Summing up, there seems to be little doubt that the LRTAP secretariat falls clearly into the "stage-hand" category - and even a relatively weak one, resourcewise. However, we seem to know less about exactly what this has meant for the cooperative process.

#### *5.2.4. The role of the agenda: the triumph of sequential decision-making?*

##### *"Conceptual background"*

At the outset, it should be noted that the reasoning related to the role of the agenda is very much geared towards the effects on the outputs of conferences and regime meetings, reflecting its roots in the negotiation literature. Hence, in an effectiveness context which includes national level policy and implementation processes, the causal chain to the structure of the agenda becomes indirect and quite long — in a sense, "going through" regime outputs.

A central keyword in this connection has been "negotiation flexibility", i.e. the possibility of adding and subtracting issues and parties (e.g. Sebenius, 1990), in order to avoid overwhelming comprehensiveness, but still having the possibility to put together "packages" that promise a sufficient joint gain to be attractive to a large number of parties. Moreover, Sebenius advises proceeding sequentially with specific agreements/protocols, and pick "easy" subjects first. However, it should be noted that the idea of the adding and subtraction of issues seem to necessitate a *fairly* comprehensive agenda in order to be workable (i.e. you have to have a "critical" mass of issues in order to subtract and add).

##### *"The LRTAP picture"*

A first, general reflection is that there is in fact a limited number of negotiation analyses which may offer interesting observations in this connection (Jackson, 1990; Gehring, 1994; Stenstadvold, 1991; Levy, 1993).

Turning to substance, first, the very loose and open-ended agenda laid out in the LRTAP Convention should be noted. This "basic" issue flexibility has been pinpointed as an

institutional strength: "As a result, although LRTAP was created primarily because of a political crisis over Scandinavian lakes and sulfur, it has evolved into a forum for coordinating research and policies toward a variety of pollutants (many thought not to present transboundary problems in 1979) which threaten a variety of receptors also not thought to be at risk in 1979.." (Levy, 1993:110; see also Sand, 1990:257). More generally, the development of the LRTAP agenda may definitely be termed "sequential", with an initial focus on O<sub>2</sub>, turning thereafter to the NO<sub>x</sub> problem, and then on to the VOC problem, before the parties returned to SO<sub>2</sub> in 1991. On the one hand, this can of course be seen as a "rational" ability to decompose a complex "transboundary air pollution problem" into several, more manageable problems - dealt with gradually, as knowledge has improved. On the other hand, it may also have something to do with interests in the first rounds of protocol negotiations. According to Gehring (1992:142-44), a Central European suggestion to extend the proposed sulfur regime to cover also NO<sub>x</sub> emissions was rejected first and foremost by the Nordic countries. However, as the knowledge on the considerable degree of interplay between the various pollutants (into "acid cocktails") has increased, the next round of LRTAP negotiations - which "naturally", according to practice so far, would be on a new NO<sub>x</sub> protocol - may be on a protocol targeting a broader group of substances than NO<sub>x</sub> alone. Hence, this discussion may indicate a certain frustration with regard to a sequential, "narrow" approach among the Parties. However, on the whole, it seems right to say that the Parties so far seem to have regarded this more "narrow" negotiating approach, focusing one group of substances at a time, as the most effective in this context. This remains to be further substantiated, however.

In addition, an intricate structure of scientific, technical, economic and political working groups have seemingly effectively decomposed the undoubtedly comprehensive agenda. In this connection, as additional indications of the merits of flexibility, LRTAP has also used smaller and more informal workshops focusing on smaller parts of the problems.

#### *5.2.5. The organization of the science-politics interface: a complex, but copyable model?*

##### *"Conceptual background"*

Several studies indicate that the knowledge production and technology diffusion aspects related to the functioning of international resource and environmental regimes are very important features indeed. It was for instance concluded in Kay and Jacobson's 1983 book: "We are struck...by the differential effectiveness of international organizations in cases where problem identification is given a clear priority, as contrasted to cases where activity takes place in the absence of any such consensus or of a major effort on the part of the secretariat concerned to build and maintain a consensus on the nature of the problem" (s.324). However, in my view, what is very much lacking in this discussion so far is a more precise

identification and assessment of the specific *international organizational* component in this connection. The most notable exception that I am aware of, is the "buffer" thesis launched by Ed Miles (1987). Miles found that one of the most important factors in scientific consensus-building is the presence or absence of direct distributive and regulatory links, and that "indirect rather than direct links to management decisions will facilitate the emergence of consensual knowledge" (Miles, 1989:49). Particularly in situations where the level of political conflict is high, direct links to the regulatory body may "contaminate" scientific research. But what, more precisely, qualifies as an "organizational buffer", and what does not? I would suggest the following operational definition: an organizational science-politics "buffer" is a specific, formal body within the cooperation, staffed with administrators with some kind of a natural scientific training, and with the mandate of discussing (but not deciding on) questions in the science-politics interface. On this background, it may generally be assumed that regimes with a scientific-political complex organized along such lines function better than regimes with no such buffers.

Regarding the more specific implementation phase, a different institutional perspective may be indicated. Here, a possible pathway of learning and influence from international to national processes could be the participation of *national* scientific/technical bureaucrats in international scientific/technical bodies and networks. The logic is that such participation — and related interaction with the secretariat — could possibly form the basis of "*epistemic communities*" (e.g. Haas, 1992). In the same manner as such "coalitions" may help *create* an agreement, subsequently they may also divert their energy towards the implementation process.

### *"The LRTAP picture"*

A first, general comment may be that the knowledge production system, and especially the EMEP program, has been one of the most commented upon institutional features within the LRTAP regime (e.g. Dovland, 1987; Levy, 1993, 1995; Wettestad, 1991, 1995 B).

Let us first briefly describe the institutional set-up. A first thing to note is that part of the LRTAP "scientific-political complex" lingered on from pre-Convention days, namely the Working Party on Air Pollution Problems" (WPAP). WPAP was initially under the ECE body 'Senior advisers to ECE Governments on Environmental and Water Problems.' Other parts of the scientific-political complex grew out of the aforementioned OECD monitoring program, namely the EMEP ("Cooperative Program for Monitoring and Evaluation of Long-range Transmissions of Air Pollutants in Europe") program. The rest of the complex was established in connection with the convention, with sub-groups gradually being added to the structure. Up until 1991, the structure was roughly as follows: on the administrative, political side, the main bodies have been the "Executive Body" (EB) of the Convention, with the parties meeting annually since 1983, and the "Working Group on Abatement Strategies"

(WGAS), an important forum for continuous negotiations (established in 1989). On the scientific/technical side, important subsidiary bodies under the EB have been the "Working Group on Effects" (WGE); the Working Group on NO<sub>x</sub>; the "Working Group on VOCs" (WGV); the EMEP Steering Body; the "Group of Economic Experts on Air Pollution" (GEAP); and the aforementioned "Working Party on Air Pollution Problems" (WPAP). Under these bodies, several "International Cooperative Programs" (ICPs) and Task Forces have been established.

This organizational setup was reorganized in November 1991. The current organizational structure is somewhat simpler: on the administrative/political side, in addition to the EB, there is now a "Working Group on Strategies" (WGS). On the scientific/technical side, in addition to the "Working Group on Effects" (WGE) and the EMEP Steering Body, there is now a "Working Group on Abatement Techniques" (WGT). Current International Cooperative Programs under the WGE are forests (Germany), freshwaters (Norway), materials (Sweden), crops (UK), and integrated monitoring (Sweden).

The EMEP monitoring program warrants some specific, introductory comments. It was initiated by the ECE in cooperation with the United Nations Environment Program (UNEP) and the World Meteorological Organisation (WMO) as a part of UNEP's "Global Environment Monitoring System" (GEMS). The main objective of EMEP is to provide governments with information on deposition and concentration of pollutants, as well as on the quantity and significance of long-range transmission of pollutants. The program has three main elements: emission data, measurements of air and precipitation quality, and atmospheric dispersion models. The EMEP sampling network consists of some 100 stations in 33 countries, and the work is coordinated by three international centres, two in Oslo and one in Moscow. In 1984, a specific EMEP financing protocol was established. Funding is now provided by all Parties to the EMEP Protocol, according to a cost sharing agreement developed by the Parties to the Convention on the basis of the UN "assessment scale" (based on GNP, population and geographic criteria).<sup>15</sup> The 1995 EMEP budget was around 1,9 million dollars.

So: has this organizational model been a successful one? First, related to what was mentioned in the section on the agenda, the basic flexibility of the system must be deemed a success. As noted by Levy (1993), the fact that LRTAP has been "consistently science- and ecosystem-driven" means that working groups have gradually been organized around potential environmental damages, and permitted any transfrontier pollutants to enter the diplomatic agenda. "This accounts for the ease with which VOCs entered the agenda, as well as for the

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15 Dovland; H. : "Monitoring European Transboundary Air Pollution", Environment, December 1987; personal communication with L.Nordberg, LRTAP Secretariat.

current investigations into mercury and persistent organic compounds" (Levy, *ibid.*:111). Second, the "formally advanced" (e.g. financing based on a separate, specific protocol) and seemingly well-functioning EMEP system has represented a strong scientific foundation and "core" in the development of the regime; compared for instance to regimes like the North Sea and ozone, seemingly the best-functioning and most centrally placed monitoring system. Third, the other possible organizational difference from other international environmental regimes is the permanent negotiating forum, the "Working Group on Strategies". This body *may* be seen as the kind of mediating buffer between science and politics envisaged by Miles - a "not too formal" meeting-place for scientists and administrators, allowing the building of consensual knowledge on both scientific and political strategic matters. However, this is mostly speculative, as we so far only have general descriptions of the functioning of the WGS (e.g. Wettestad, 1995 B, "...a coordinating and 'translatory' role, as it cannot fulfil its negotiating role without inputs from all the other bodies"). True, there are bodies within other regimes which are at least comparable, for instance the former "Technical Working Group" within the PARCON regime, but with much less explicit weight given to the negotiating/policy aspects. Hence, the functioning of the WGS should be an interesting (comparative) topic for further study - in order to further delineate the degree of uniqueness of and "success" related to the LRTAP institutional approach.

#### *5.2.6. Verification and compliance: a unique verification capacity not further utilized?*

##### *"Conceptual background"*

Compared to most of the factors that have been discussed so far, the issues related to verification and compliance are clearly geared more towards the implementation phase. But as there is a constant interplay between regime meetings/regulatory development and implementation processes in most environmental regimes, these issues are of course also relevant for regime outputs. Reports of lacking or inadequate implementation will surely not exactly bolster the Parties' willingness to strengthen and extend regime regulations...

On the basis of previous and current scholarly attention given to these issues (e.g. Young, 1979; Chayes and Chayes, 1991, 1993, forthcoming; Victor/Ausubel, 1992; Mitchell, 1994 A and B; Victor et.al., 1994), it seems also reasonable to assume that these factors are among the causally most important institutional factors. Just to pick two examples from the quite recent effectiveness literature: Young (1992) suggests that the effectiveness of international institutions varies directly with the ease of monitoring or verifying compliance with their principal behavioral prescriptions (p.176). In the same vein: according to Haas/Keohane/Levy (1993), "the monitoring activities of international institutions can be vital to the ability of states to make and keep agreements" (p.22). I would further suggest distinguishing between two main, related issue complexes within this broader field; first, the verification part, related



to reporting and "checking" of compliance; and second, what may be referred to as "compliance strengthening" mechanisms, either "negative" (some form of sanctions) or "positive" (for instance economic incentives like compensation funds).

A rough summary of my interpretation of the knowledge status so far :

reports on follow-up can be both generally confidence-building and contribute to various forms of learning — and through these processes, possibly enhance effectiveness more than most other institutional factors. It may generally be assumed that such reports will be most trustworthy if they include other sources of information than only the states own reports. The need for sanctions can be assumed to be related to factors like regulatory strength and related economic/political implications: the closer the international environmental measures get to "high politics", the more relevant the discussions and possible use of sanctions. The need for "positive" incentives can be assumed to be first and foremost dependent on the heterogeneity of the regime parties.

### *"The LRTAP picture"*

This aspect of the LRTAP regime has mostly been generally commented upon so far (Sand, 1990; Levy, 1993; Wettestad et.al., 1991), but more specific studies are under way (di Primio, 1996).

An important point of departure here is that monitoring of state performance has been mainly based on the parties' annual reports to the secretariat on emissions and procedures adopted for the abatement of emissions and the measurement of acid precipitation. In addition to the annual reports, there is a more comprehensive review of national abatement strategies and policies every four years. However, what sets LRTAP a little bit apart is a limited capacity for additional, "independent" verification. This capacity stems from the EMEP monitoring system, based on emission data, measurements of air and precipitation quality, and atmospheric distribution models. Referring to the periodic reviews and the EMEP system, Sand (1990:259) maintains: "Few other international agreements can be said to come equipped with verification instruments of this caliber". However: also the reports of EMEP are partly based on national "self-reports"; moreover, some countries have failed to report emissions, and monitoring coverage in Southern Europe is seen by EMEP as insufficient (Levy 1993:89). But this is a point that certainly warrants further attention, as it is in a way the critical test of the extent to which LRTAP really is a "unique" model in terms of verification.

To my knowledge, critical compliance discussions have so far been non-existent. As stated by Levy (1993:91): "Strategy and policy reviews are not interpreted; they are simply collated and published. There is no effort to ascertain whose measures place them in compliance with

either specific protocols or broader norms...Although no one is ever 'cross-examined', states frequently make oral statements offering clarifications and emphasizing major points at EB meetings". Hence, the question of sanctions has therefore been uninteresting. Does all this mean that the verification instruments "even of this calibre" have been without importance for state policies? As far as I can see, this remains to be investigated further.

It should also be noted that an institutional change is announced in connection with the new sulfur protocol. A specific implementation committee is going to be established, with a mandate of reviewing implementation and compliance, and including decisions on "action to bring about full compliance with the protocol" (art.7). The practical implications are hard to evaluate. Within environmental politics, the institutional model has probably been the implementation committee established within the ozone-layer regime. However, that committee has not functioned long enough to draw any practical conclusions.

With regard to the "positive" incentive aspects, LRTAP offers no institutional "positive" incentives. However, the establishment of some sort of financial mechanism, facilitating "burden sharing" in connection with the possible additional abatement costs envisaged for meeting "critical loads" in different parts of Europe, is being discussed (Levy, 1995).

Summing up: if LRTAP has been unique in terms of verification and compliance so far, then this must be related to the EMEP's system capacity for "independent" verification and not to the compliance procedures. However, the "real" independence of the EMEP system remains to be clarified. Moreover, the actual effects on states' policies of this additional verification capacity also remains to be investigated.

### **5.3. "Regulative" regime aspects: type of rules.**

#### *"Conceptual background"*

Regimes produce outputs/regulations, which are the most specific and direct points of departure for national implementation efforts - but which I think should be seen as primarily intermediate variables in relation to more "structural" regime features like access rules and decision rules. Building on Andresen/Skjærseth/Wettestad (1995), I think it is possible to discern at least three major dimensions of regime regulatory "strength": "legal status"; "specificity"; and "differentiation" .

Regarding legal status, the main difference is between regulations being legally binding upon the states having agreed to them, and regulations having no such binding status - being cast in the form of recommendations or political statements of intent. Generally, I would assume

that states would find it politically more difficult to disregard binding decisions, and hence that binding international decisions are implemented more effectively than recommendations.

Turning to specificity, on the one hand, this has to do with the question whether international decisions contain quantitative targets. Another aspect of this is whether such reduction targets are to be achieved within specific time-frames. Again, everything else equal, I find it reasonable to assume that a specified decision will result in "more" implementation and behavioral impact than a more generally worded decision. Among other things, specific emission targets and deadlines establish explicit focal points, which make it easier for domestic and international watchdogs to intervene in the process. Hence, these aspects are probably related to the "verifiability" question.

Finally, the question of differentiation has to do with the extent to which international regimes have different targets and time-lines for different types of actors. The traditional environmental agreements have tended to place equal obligations on all parties, irrespective of their capacity and ability to implement. Recently, more flexible approaches have been suggested, primarily as a means to reach agreement, but it may also affect the process of implementation. Such agreements may be perceived more legitimate by otherwise sceptical participants, and increase - if not their capacity - at least their possibility and political will for subsequent implementation.

### *"The LRTAP picture"*

As far as I can see, related aspects have first and foremost been commented upon by Levy (1993).

Let us first sum up the development over time. Turning first to the 1979 Convention, it is definitely binding, but its specificity is low, generally talking about the "limitation and gradual reduction and prevention" of transboundary air pollution.

Moving on to the 1985 sulfur protocol, it is also binding, but with higher specificity, including both the 30% reduction target and the 1993 time-limit. Flexibility is naturally lower. The 30% target has been characterized as primarily a political compromise.

Much of the same reflections apply to the NO<sub>x</sub> protocol, but here one should also be aware of the 30% reduction political declaration, signed by a smaller group of parties.

The 1991 VOC protocol is also binding and quite specific, and this protocol also marks a move towards greater flexibility: some countries are allowed to reduce emissions within

specific "tropospheric ozone management areas", and there is also some flexibility with regard to baseline/starting point.

The most recent regulatory step is the revised sulfur protocol which was signed in Oslo in June 1994. It is both binding and specific, including both specified targets and timetables. However, the key point is how these elements are combined with flexibility on the basis of so-called "critical loads". The crux of this approach is that emissions reductions should be set on the basis of the varying effects of air pollutants, and the variations in abatement costs among countries, rather than by choosing an equal percentage reduction target for all countries involved.

So far the rough regulatory development. What about the impact implications, then? Have for instance binding and more specific regulations led to higher implementation and more behavioral change than political declarations and less specific regulations? Let us first focus on the contrast between the 1979 convention and the 1985 30% protocol. An interesting thing to note here is that quite a lot of the emissions reductions witnessed in the 1980s occurred *before* the 1985 protocol was established. Hence, at first glance, it may seem that the generally worded convention led to almost as much behavioral change as the much more specific sulfur protocol. However, as indicated by the national case studies in the previous section, the main point must be that the impact question is first and foremost uncertain. Judging by the case studies focused in this report, neither the convention nor the protocol seem to account for *very* much of the emissions reductions witnessed.

Moreover, a very interesting aspect related to the LRTAP nitrogen oxide processes is the contrast between the implementation performance related to the protocol versus the declaration. These regulations are of course not directly comparable, as the declaration's 30% target is a much more "ambitious" target than the protocol's stabilization target, and the 30% declaration is not formally part of the LRTAP structure. Still, despite such "methodological" problems, an interesting question is whether the seemingly lower compliance record related to the declaration than the protocol may have something to do with the formally less binding character of the declaration. But it is still possible that even if the countries do not achieve the 30% target, they may still have performed better than they would have done with only the protocol in operation...

More generally, with regard to the impact of LRTAP rules, Marc Levy's (1993) concept of "toteboard diplomacy" is interesting. According to Levy, although the regulatory rules were weak, they were not irrelevant. "They served a vital role in magnifying pressure on recalcitrant states, in keeping the consensus-building activities high on governments' agendas, and in assisting domestic environmental proponents of action" (p.77). Hence, the "toteboard" perspective points toward a complex interplay picture, with various types of interactions

between "structural", "regulative" and "external" causal factors. The regime *process* matters<sup>16</sup> - yes - but making precise causal "measurements" of the contributions of the various factors in such a situation is quite challenging, and calls for more detailed, national research than has been carried out so far.

Summing up: a regulatory development may be discerned, with regulations gradually becoming both binding, specific and more fine-tuned to ecological and economic variations among the countries. However, the impact implications of this regulatory development are quite tricky. It seems that substantial emissions reductions took place at a time before regulations became more specific and binding, and the main part of the more recent emissions reductions probably has nothing to do with the international regulations and/or their design. The possible "softer", more diffuse "toteboard" effects remain to be substantiated.

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16 In another context, I have suggested the term "discursive diplomacy" for these important, but elusive aspects of LRTAP decision-making and functioning (Wettstad, 1995 C).

## 6. Concluding Comments. Ten Acid Lessons...

Let us sum up this study by giving tentative answers to the "ten most asked questions" formulated in the introduction.

### *IS LRTAP A "HIGH-COMPLIANCE" REGIME?*

The answer must be in the affirmative. Significant emissions reductions have taken place. Regarding the 1985 sulfur protocol, all Parties have reached the 1993 30% target; and twelve Parties have achieved reductions of at least 50%. Regarding the 1988 NO<sub>x</sub> protocol, the 1994 stabilization target has been reached by a clear majority of the Parties, but the data situation is not optimal; for instance three cases cannot be evaluated due to lacking base year data. Regarding the related 1998 30% reduction declaration, the perspectives are more gloomy; so far, an overall 4% reduction can be noted. Finally, with regard to VOC, of the eleven countries (out of 23 Parties) providing data for 1993, an overall reduction of around 15% may be noted. Hence, there is some way to go in relation to the 1999 30% target.

### *HAVE THE ACID RAIN PROBLEMS ADDRESSED BY LRTAP BEEN SOLVED SO FAR? WOULD THE PROBLEMS HAVE BEEN WORSE WITHOUT THE LRTAP REGIME?*

With regard to the first part of this question: no. For instance, the situation in Norway has seemingly only worsened in the 1990s. Due to among other things time lags between developments in emissions and changes in the environment, the emission cuts achieved so far have not yet led to marked improvements. Overall, "solution" and getting below "critical loads" in the environment is partly a matter related to the implementation of newly established regulations, and in reality demanding even further emission cuts, extending well into the next century. Would the problems have been worse without the LRTAP regime? Yes, but the specific LRTAP contribution so far is uncertain - probably not very high, but hard to "measure" precisely. But what about "critical loads" and the new, perhaps uniquely advanced protocol? Well, this indicates that there is a process dimension to regime effectiveness that a strict "behavioral" definition ignores. In a process, more forward-looking perspective, the LRTAP achievements seem more impressive.

### *ARE THE MAJOR CAUSAL FACTORS FOR COMPLIANCE LEVELS FOUND WITHIN THE SPHERE OF "ENVIRONMENTAL POLITICS"?*

Seemingly no, at least not in three of the four countries focused in this study. The main part of the reductions and compliance levels achieved in these three countries (the UK,

Netherlands, and Norway) are seemingly explained by societal processes not primarily related to environmental protection, at least with regard to sulfur reductions. In the UK, industrial recession and lowered energy demand in the 1980s are important factors. In the Netherlands, a gradual conversion to "domestic" natural gas for supply and domestic political and financial reasons is an important perspective. In Norway, much has been achieved by decreasing consumption of heavy crude oil on land. The exception is Germany, where "environmental regulations" in fact seem to be the main driving force.

However: motivations for policy measures are often multiple and hard to track exactly, so these conclusions should definitely be regarded as tentative.

### *CAN "NATIONAL INTERESTS" ROUGHLY PREDICT LEVELS OF COMPLIANCE?*

To some extent they can. As could be expected, countries with substantial perceived acid damages like Norway and (West) Germany have ended up as far stronger implementors than the marginally damaged "acid exporter" the UK. Moreover, this perspective seems to be more relevant in the sulfur context than in the NO<sub>x</sub> context. This may have something to do with "structural" differences between the sulfur and NO<sub>x</sub> problems - with sulfur emissions very much stemming from a limited, "overseeable" number of industrial point sources, while NO<sub>x</sub> emissions involving a number of other, more diffuse transport actors, complicating both present and future abatement cost estimates.

Still, there are several problems with this perspective in an "environmental implementation" context: first, decisions about national compliance and implementation in this context are continuous, and hence, the questions of costs and benefits are "moving targets". Second, even if we imagine only *one* decision to comply or not early in the process (as I have tentatively tried), the questions of costs and benefits are complicated. A common observation is that costs are somewhat easier to quantify than benefits, and it is easy to imagine that the balance is tilted in that direction. Third, the relevance of the domestic politics perspectives is in a sense structurally given by the fact that important implementation agents (like power stations and firms) have not been under direct societal control. Hence, no matter how the governmental weighing of costs and benefits turns out, some "societal bargaining" over regulatory terms and implementation seems inevitable. Somewhat paradoxically, the main exception is the "laggard" UK, where power stations were under governmental control in most of the relevant period. Here, lack of "green" governmental will and strong leadership in the Central Electricity Generating Board (CEGB) combined to make the formally promising control over abatement processes irrelevant.

## *WHAT ASPECTS OF DOMESTIC POLITICS MATTER MOST?*

This varies of course, both between processes and between countries.

As indicated above, a central "domestic" factor shedding light over the seemingly higher implementation effectiveness of the sulfur process compared to the NO<sub>x</sub> process is the differences in regulatory affectedness; i.e. the number and type of actors targeted in regulatory processes - with more and, somewhat surprisingly, seemingly less "governable" actors being involved in the NO<sub>x</sub> processes. In this respect, the common unifying theme in the cases is the difficulty of predicting and dealing with emissions from road traffic.

In other respects, the differences between the sulfur and NO<sub>x</sub> processes in the countries seem to vary, with Norway as a clear example of sharp differences between the processes. In this country, the NO<sub>x</sub> issue led to a protracted inter-ministerial battle, unheard of when less costly sulfur controls were established and implemented...

Another matter shedding light over the differences between the processes is of course the fact that the sulfur issue has had a longer scientific and regulatory history than the NO<sub>x</sub> issue, giving sulfur a certain regulatory "head start".

With regard to other differences and similarities between the countries, differences in regulatory philosophies and styles seem to throw much light on the different roles and performances of the UK and Germany. A "consensual" regulatory model may throw light on the relative lack of Dutch domestic conflict over regulatory policies. Public opinion and public pressure seem to have been important forces in Germany, but not very much in the other countries. The generally weak position of environmental ministries in inter-ministerial wranglings shed light over the question "why not a(n) (even) stronger implementation record" in several of the countries. Perhaps somewhat surprisingly, the federal structure of Germany seems not to have complicated German processes much; in fact, this structure led to a green competition between central and local forces, and infused extra political energy into the development of acid policies. Personal factors, like the Thatcher "small club" decision-making style in the UK, should not be ignored. An interesting observation: contrary to an intuitive assumption that it is easier for public authorities to influence actors within the public apparatus than private actors, it was seemingly easier to influence German private target groups than British public ones.



*WHAT ROLE HAS LRTAP PLAYED FOR NATIONAL "ACID REDUCTIONS", COMPARED TO OTHER INTERNATIONAL FACTORS AND "PURE" NATIONAL FACTORS?*

The short answer is: not very much for these particular countries. The LRTAP process is obviously important as an arena for the creation and maintenance of inter-governmental confidence and learning. But if LRTAP had not existed, significant reductions would have taken place due to "non-environmental" processes and "environmental political pressure" motivated by domestic damages. The most obvious and important example is Germany. After domestic uproar about "Waldsterben" (which the public associated with acid rain and pollution) and related national policy initiatives, Germany changed from "laggard" to "pusher" on the international arena - with LRTAP and the EC as two main useful fora. More generally, with regard to German and British acid rain politics, the EC decision-making arena has probably been more important than LRTAP. However: there is still a possibility that LRTAP has been more important for the other West and East European countries not discussed here. For instance, Levy (1993:123) indicates that LRTAP has influenced emissions policies in countries like the former USSR.

*ARE THERE CERTAIN FEATURES OF LRTAP INSTITUTIONAL DESIGN THAT HAVE BEEN MORE IMPORTANT THAN OTHERS?*

Given the answer above, this is bound to be a tricky discussion "on the margin". Still, some tentative observations may be offered. Given that so many observers and "insiders" stress the confidence-building and learning aspects related to LRTAP, three factors stand out from the rest. First, the very existence of the protocols themselves has obviously given increased confidence to hesitant countries that important emitters were taking this problem quite seriously. The regulations also created a certain basis for limited inter-state pressure - cf. the notion of "toteboard diplomacy" (Levy, 1993), where in a sense weak LRTAP regulatory rules have served a role in magnifying pressure on recalcitrant states, in keeping the consensus-building activities high on governments' agendas, and in assisting domestic environmental proponents of action. Second, the diverse scientific-political complex, with the well-functioning EMEP monitoring system as a solid core, provided information crucial to the progress of the process, especially in the early 1980s. Third, EMEP data also contributed to making verification of the various countries' implementation processes more trustworthy, further building confidence (for further comments to this issue, see di Primio, 1996).

### *HOW HAVE THE MOST IMPORTANT INSTITUTIONAL FEATURES AFFECTED POLICY AND IMPLEMENTATION PROCESSES?*

Based on information about the countries focused here, by far the most important mechanism within the LRTAP regime has been the provision of information, and the related interplay between governmental and non-governmental national actors. The British case is the best documented with regard to the functioning of this mechanism. Both NGOs and more official political bodies actively utilized LRTAP reports and regulations to put pressure on the British government, however with little short-term success. As more of a digression, it may be indicated that the international provision of "legitimizing" authority and capability to scientists and environmental authorities may be an important additional mechanism in Eastern Europe.

### *ARE THERE MANY AREAS OF CONFLICTING ASSESSMENTS IN CURRENT LITERATURE?*

No. Although LRTAP may be one of the most "advanced" and well-researched among the environmental regimes, the bulk of the studies so far are of a quite general nature and focus on regime formation and process/negotiation aspects. Hence, not *very* many detailed studies of the policy and implementation processes yet exist. In the few cases where several national studies have been carried out, concepts and foci vary quite a bit. Take for instance the UK situation: later studies, like the Waterton (1993) UK case study (which is one of the case studies within the Clark/"Social learning" project), draw heavily on "seminal" studies by authors like McCormick (1989) and not least Boehmer-Christiansen/Skea (1991) - without explicit critical examinations of the earlier results. This is understandable, as "implementation" is only one of a number of issues addressed by Waterton and the Clark/"Social learning" project. Hence, research so far has been mainly *complementary*. However, the situation may be changing, as new studies from several large-scale projects are in the process of being published (e.g. the Clark and Hanf/Underdal projects). What about the crucial effectiveness question - do analysts agree? To a large extent, yes. There seems to be a shared feeling of "more success than failure". But due to lacking implementation information, and not least lacking information about the emissions reduction that would have taken place "anyway" due to general economic and energy policy development, uncertainty is still substantial. Take Marc Levy (1993:126), who has probably carried out the most elaborate assessments so far; "the sulfur protocol *probably* had significant effects on the emission reductions in seven countries, including the largest and fourth-largest emitters in Europe (USSR and United Kingdom). A protocol that affects only these seven *probably* counts as a success" (my emphasis added).

## *WHAT ARE THE MAIN CHALLENGES FOR FURTHER RESEARCH?*

Generally, with regard to implementation knowledge, quite understandably, so far much more focus has been directed towards the "older" sulfur process than the somewhat more recent Nox and VOC processes. Hence, we need to direct more attention to the latter processes.

With regard to more specific themes, the challenges depend of course on what type of processes we are interested in. In order to say something about the causally most important processes for past and future implementation processes, we should probably focus on mainly "non-environmental processes like energy supply trends, energy prices, industrial development trends, long-term transport trends - and so on. Given the interest many of us share in "causally less important, but politically more manipulable" .. institutional international and national processes, two main, partly linked, areas may be indicated. First, international-domestic access and participation linkages is obviously an interesting field of inquiry. What did participation in international scientific and political bodies mean for the "national power position" of scientists, NGOs and administrators? How was the open international access utilized domestically by various domestic forces, like industry and environmentalists? What about the differences between types of issues; e.g. do lessons from the older and, in terms of actors, simpler sulfur process hold true in more recent processes where the challenge is to handle participation by a number of stakeholders, many of whom oppose expensive implementation measures? Some information about these issues already exists, like for instance in the case of Britain, so it is very much a case of focusing and augmenting existing knowledge. Second, the interplay between EC and LRTAP processes should be further clarified. Also in this case, it is more a question of focusing and augmenting current knowledge than to start from scratch. Here, among other things, the SEER2 phase within the Hanf EC-financed project will give us useful information on this interplay.

## REFERENCES

Andresen, S.; Skjærseth, J.B.; Wettestad, J. (1995). *Regime, the State and Society: Analyzing the Implementation of International Environmental Commitments*, IIASA Working Paper WP-95-43.

Boehmer-Christiansen, S. and Skea, J. (1991). *Acid politics: environmental and energy policies in Britain and Germany*, London, Belhaven Press.

Boehmer-Christiansen, S. and Weidner, H. (1995). *The Politics of Reducing Vehicle Emissions in Britain and Germany*, London, Pinter.

Boehmer-Christiansen, S. (1995). The British Case Study: Policy Formulation and Implementation, SPRU contribution for the Hanf project on LRTAP implementation.

Bjørkbom, L. (1993). International Environmental Policy in a Wider Context, in Sjøstedt/Svedin/Aniansson (eds.), *International Environmental Negotiations - Process, Issues and Contexts*, Stockholm, The Swedish Institute of International Affairs.

Chayes, A. and Chayes, A. (1991). Compliance Without Enforcement: State Behaviour Under Regulatory Treaties, *Negotiation Journal*, July, pp.311-30.

- (1993). On Compliance, *International Organization*, 47:2, Spring.

- (forthcoming). *The New Sovereignty*.

Chossudovsky, E. (1989). *East-West Diplomacy for Environment in the United Nations*, New York, UNITAR.

Churchill, R.; Kutting, G.; Warren, L.M. (forthcoming). The 1994 UN ECE Sulphur Protocol, *Journal of Environmental Law*.

Clark et al. (forthcoming). *Learning to Manage Global Environmental Risks*.

Dinkelman, G; van der Sluis, J.; Pleune, R.; Worrell, C. (1994). "Finding your place". A history of the Management of Global Environmental Risks in the Netherlands, draft for the project on "Social Learning in the Management of Global Environmental Risks".

di Primio, J.C. (1996). Monitoring and Verifying Compliance in Environmental Agreements - The Case of Acid Rain in Europe, draft, IEC project, IIASA.

Dovland, H. (1987). Monitoring European Air Pollution. *Environment*, December.

Fraenkel, A. (1989). The Convention on Long-Range Transboundary Air Pollution: Meeting the Challenge of International Cooperation, *Harvard International Law Journal*, 30, 2, Spring 1989.

Gehring, T. (1994). *Dynamic International Regimes. Institutions for International Environmental Governance*, Berlin, Peter Lang Verlag.

Haas, P. (1992). Introduction: Epistemic Communities and International Policy Coordination, *International Organization*, 46, 1, pp.1-37.

Haas, P. M.; R. Keohane; and M. Levy (eds.) (1993). *Institutions for the Earth. Sources of Effective Environmental Protection*, The MIT Press, Cambridge, Massachusetts and London, England.

Haigh, N. (1987). *EEC Environmental Policy and Britain*, Essex, Longman.

Haigh, N. (1989). New Tools for European Air Pollution Control. *International Environmental Affairs*, vol. 1, Winter issue.

Hanf, K. and Underdal, A. (1994). Domesticating International Commitments - Linking National and International Decision-Making, in Underdal, Arild (ed.), *The International Politics of Environmental Management*, Kluwer Academic Publishers.

Jackson, C.I. (1990). A Tenth Anniversary Review of the ECE Convention on Long-Range Transboundary Air Pollution, *International Environmental Affairs*, 2, 3, Summer 1990:217-26.

Jäger, J.; Cavender Bares, J.; Blumhuber, C.; Loerbroks, I. (1993). The issue of acid rain and long-distance transport of pollution in Germany, draft for the project on "Social Learning in the Management of Global Environmental Risks".

Lammers, J.G. (1988). The European Approach to Acid Rain. In Magraw D.B. (ed.), *International Law and Pollution*, Philadelphia, Univ. Penn., pp. 265-309.

Laugen, T. (1995). *Compliance with International Environmental Agreements \_ Norway and the Acid Rain Convention*, R:003-1995, the Fridtjof Nansen Institute.

Levy, M. (1993). European Acid Rain: The Power of Tote Board Diplomacy. In Haas, Keohane, Levy (eds.), *Institutions for the Earth*, see reference above, pp. 75-133.

Levy, M. (1995). International Co-operation to Combat Acid Rain, *Green Globe Yearbook 1995*, Oxford University Press.

Levy, Marc and Young, Oran (1993). The Effectiveness of International Regimes, draft.

Liberatore, A. (1993). The European Community's Acid Rain Policy, draft for the project on "Social Learning in the Management of Global Environmental Risks".

Liefferink, J.D. (1995). *Environmental policy on the way to Brussels. The issue of acidification between the Netherlands and the European Community*, Wageningen, Thesis Landbouw Universiteit.

McCormick, J. (1989). *Acid Earth*, London, Earthscan.

Miles, E.L. (1987). Science, Politics and International Ocean Management: The uses of Scientific Knowledge in International Negotiations, Institute of International Studies, University of California, Berkeley, Policy Papers in International Affairs, no.33.

- (1989). Scientific and Technological Knowledge and International Cooperation in Resource Management. In Andresen, S. and Østreng, W. (eds.), *International Resource Management: The Role of Science and Politics*, London, Belhaven Press, pp.46-88.

Mitchell, R.B. (1994). *Intentional Oil Pollution at Sea - Environmental Policy and Treaty Compliance*, Massachusetts, MIT Press. 1994 A.

- Regime design matters: intentional oil pollution and treaty compliance, *International Organization*, 48, 3, Summer 1994.

Najam, A. (1995). *Learning from the Literature on Policy Implementation - A Synthesis Perspective*, IIASA Working Paper WP-95-61.

Nordberg, L. (1993). Combatting Air Pollution, LRTAP "non-paper", March 1993.

Oden, S. (1968). The acidification of air and precipitation and its consequences in the natural environment, *Ecology Committee Bulletin*, no.1, Swedish National Science Research Council, Stockholm.

Park, C. (1987). *Acid Rain - Rhetoric and Reality*, London.

Persson, G. (1993). The Acid Rain Story, in Sjøstedt/Svedin/Aniansson (eds.), see Bjørkbom above.

Raadschelders, J. (1994). Implementation of a sulphur dioxide policy in the Netherlands, BCR Consultants, draft for the Hanf project on LRTAP implementation.

Rittberger, Volker (ed.) (1990). *International Regimes in East-West Politics*, London and New York, Pinter publishers.

- (1993). *Regime Theory and International Relations*, Oxford, Clarendon Press.

Sand, P. (1990). *Regional Approaches to Transboundary Air Pollution*, in Energy: Production, Consumption and Consequences, Washington.

Sandford, Rosemary (1992). Secretariats and International Environmental Negotiations: Two New Models, in Susskind/Dolin/Bresslin (ed.): *International Environmental Treaty Making*, Cambridge, Mass., Harvard Program on Negotiation.

- (1994). International Environmental Treaty Secretariats: Stage-Hands or Actors?, *Green Globe Yearbook*, The Fridtjof Nansen Institute/Oxford University Press.

Sebenius, James (1990). *Negotiating a Regime to Control Global Warming*, report, Harvard University.

Shaw, R. (1993). Acid-Rain Negotiations in North America and Europe: A Study in Contrast, in Sjøstedt, G. (ed.), *International Environmental Negotiation*, IIASA, Sage pub., Newbury Park.

Sprinz, D. (1992). Why Countries Support International Environmental Agreements: The Regulation of Acid Rain in Europe, Ph.d. diss., University of Michigan, Ann Arbor.

Sprinz, D. and Vaahtoranta, T. (1994). The interest-based explanation of international environmental policy, *International Organization*, 48, 1, Winter 1994:77-105.

Stenstadvold, M. (1991). *The Evolution of Cooperation. A Case Study of the NOx-Protocol* (in Norwegian), unpublished thesis, University of Oslo.

Underdal, A. (1989). The Politics of Science in International Resource Management: A Summary, in Andresen, S. and Østreng, W. (eds.), *International Resource Management: The Role of Science and Politics*, London, Belhaven Press.

- (1990). Negotiating Effective Solutions: The Art and Science of Political Engineering, unpublished paper, the University of Oslo.

- (1995). Explaining "Success" and "Failure", Paper prepared for the 36th Annual Convention of the International Studies Association.

Victor et.al. (1994). *Review Mechanisms in the Effective Implementation of International Environmental Agreements*, IIASA Working Paper WP-94-114.

Victor, D. and Ausubel, J. (1992). Verification of International Environmental Agreements, *Annual Review of Energy and Environment*, 17, pp.1-43.

Wahl, A. and Sprinz, D. (1995). Acid rain policy in Germany, Potsdam Institute for Research on Climate Change Impact, draft for the Hanf project on LRTAP implementation

Waterton, C. (1993). The UK Case Study for Acidification and Transboundary Air Pollution - a preliminary survey, contribution to the "Social Learning in the Management of Global Environmental Risks" project.

Wetstone, G. (1987). A History of the Acid Rain Issue, in Brooks/Cooper, *Science for Public Policy*, Oxford.

Wetstone, G. and Rosencrantz, A. (1983). *Acid Rain in Europe and North America*, Washington.

Wettestad, J. (1991). The Effectiveness of LRTAP, in Wettestad, J. and Andresen, S. (1991). *The Effectiveness of International Resource Cooperation. Some Preliminary Findings*, Oslo, the Fridtjof Nansen Institute, pp.74-94.

- (1995 A). "Nuts and Bolts for Environmental Negotiators?" - *Designing Effective International Regimes. A Conceptual Framework*, note N:001-95, the Fridtjof Nansen Institute.

- (1995 B). Science, Politics and Institutional Design: Some Initial Notes on the Long-Range Transboundary Air Pollution Regime, *Journal of Environment and Development*, vol.4, no.2, Summer 1995.



Wettestad, J. and S. Andresen (1991). *The Effectiveness of International Resource Cooperation*, Oslo, The Fridtjof Nansen Institute.

Wettestad, J. et.al. (1990). *Effektiv verifikasjon av internasjonale drivhusavtaler: Teknisk oppnåelig, men politisk komplisert?*, Fridtjof Nansen Institute, EED-rapport 19/1990.

Wuster, H. (1992). The Convention on Long-Range Transboundary Air Pollution: Its Achievements and its Potential, in T. Schneider (ed.), *Acidification Research, Evaluation and Policy Applications*.

Young, O. (1967). *The Intermediaries: Third Parties in International Crises*, New York, Princeton University Press.

- (1979). *Compliance and Public Authority: A Theory with International Applications*, Baltimore, Johns Hopkins University Press.

- (1992). The effectiveness of international institutions . hard cases and critical variables, in Rosenau, J. and Czempiel, E.O.: *Governance without government: order and change in world politics*, Cambridge, Cambridge University Press.