

Working Paper

Negotiating the Acid Rain Problem in Europe: A Fairness Perspective

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WP-93-050
September 1993



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Abstract

A major problem in tackling many environmental issues, transboundary and global in particular, is the fundamental fairness concerns involved. These arise from the wide differences among countries in responsibility for the problems at hand and the degree to which they are affected by them, and the difficulty of distributing fairly the costs and benefits of regulations among parties whose interests in and ability to pay for an agreement vary drastically.

The acid rain negotiations in Europe is a prime case demonstrating that substantial emission reduction strategies must, among the core requirements involved, be viewed as *fair* if they are to be politically feasible and accepted, implemented, and honored in the long run. Research to date, however, has focused almost exclusively on the analysis and generation of options which are *effective* in economic and, more recently, environmental terms.

The study discusses the general fairness issues involved in attempts to control and reduce sulfur and nitrogen dioxide emissions in Europe, through negotiation in particular. The nature and some implications of the diverse principles underlying proposed strategies for managing the transboundary air pollution problem are analyzed. Explored is the potential applicability of certain analytic problem-solving tools in helping to bridge or reconcile, in a negotiation process, opposing positions regarding "fair" emission abatement strategies in Europe.

This paper was presented at an international conference on *Risk and Fairness* at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, June 20-22, 1993. The conference was co-sponsored by IIASA's Risk Analysis and Policy Project, and the International Academy of the Environment, Geneva. The author is Deputy Director of the Global Security Programme at Cambridge University, U.K., and was a Research Scholar in the Processes of International Negotiation (PIN) Project at IIASA in 1992-1993.

NEGOTIATING THE ACID RAIN PROBLEM IN EUROPE: A FAIRNESS PERSPECTIVE

Cecilia Albin

1. INTRODUCTION

A major problem in managing and ultimately resolving many environmental issues, transboundary and global in particular, is to tackle the fundamental fairness concerns involved. These arise notably from the wide differences among countries in responsibility for the problems at hand and the degree to which they are affected by them, and the difficulty of distributing fairly the costs and benefits of regulations among parties whose interests in and ability to pay for an agreement vary drastically. Yet, despite their extraordinary importance, fairness issues in environmental policies and negotiations have rarely been the subject of systematic research.

The acid rain negotiations in Europe is a prime case demonstrating that substantial emission reduction strategies must, among the core requirements involved, be viewed as *fair* if they are to be politically feasible and accepted, implemented, and honored in the long run. Research to date, however, has focused almost exclusively on the analysis and generation of options which are *effective* in economic and, more recently, environmental terms. Without addressing concerns about fairness, the latter -- even in the most favorable political context in which all parties genuinely strive at reaching agreement -- risk to remain hypothetical solutions incapable of advancing the negotiations over Europe's acid rain problem.

This paper has three purposes. First, it discusses the general fairness issues involved in attempts to control and reduce sulfur and nitrogen dioxide emissions in Europe, through negotiation in particular. Secondly, it brings out and analyses the nature and some implications of the diverse principles (most of them associated with a particular understanding of justice or fairness) underlying various proposed strategies for managing the transboundary air pollution problem. Thirdly, the paper begins to explore the potential applicability of certain analytic problem-solving tools in helping to bridge or reconcile, in a negotiation process, opposing positions regarding "fair" emission abatement strategies in Europe. No

attempt is made to overview the nature and scope of Europe's transboundary air pollution problem, or acid rain negotiations to date -- subjects on which a number of studies have already been completed (e.g., Schneider, 1992; Alcamo, Shaw and Hordijk, 1990; Boehmer-Christiansen and Skea, 1991; Chossudovsky, 1988; Carroll, 1988; Shaw, 1992).

2. Fairness in Acid Rain Negotiations: Some General Observations

In the last few decades, acid rain--acid deposition formed in the atmosphere primarily from sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions--has, like so many other environmental hazards, become increasingly transboundary and global in character. Scientific understanding has deepened dramatically about the sources of such emissions (notably coal and oil fired power stations and smelters, and motor vehicle exhausts), their transport across national boundaries, and extensive damage to forests, freshwaters, agricultural crops, ecosystems, and historical and cultural monuments, particularly in Europe but also in North America. Together with the depletion of the ozone layer, acid rain is today viewed widely as the most serious global environmental problem. To mention only a few of the numerous examples now recorded, acid deposition was found to have damaged about 86% of East German woodland and over 50% of West German forests in 1985 (Fraenkel, 1989), over 20% of Sweden's lakes, and drastically reduced and even eliminated entire fish populations in Norway (Brackley, 1990).

In tandem with such developments, multilateral negotiation, and the multilateral cooperation resulting from it, have increasingly become recognized as primary tools for reducing the acid rain and other environmental problems--including water pollution, global climate change, desertification, the storage of hazardous industrial wastes, and the preservation of biological diversity. Yet despite the urgent need for joint measures on many of these issues, environmental negotiations have also proven more difficult than other international negotiations in many respects. Much observed among these difficulties in the research literature are the large number of parties, deep power asymmetries, and conflicting interests involved; the highly complex and global significance of the issues; insufficient scientific knowledge and uncertainty; and the necessarily on-going nature (inconclusiveness) of any negotiating process attempting to tackle them. These hurdles have lead some analysts to conclude that an entirely new approach to international negotiation must be developed to deal with today's and tomorrow's transboundary environmental problems successfully (e.g., Sjöstedt, 1992).

To this list of characteristics of environmental negotiations must be added another complicating factor: *the prominent role played by issues of fairness, and typically conflicting concepts of fairness held by parties*. There are a number of reasons for this prominence. First, the very transboundary nature of environmental problems such as acid rain, and the need to rely on voluntary cooperation in tackling them, require the negotiation of solutions viewed by every key party as fair and worth honoring. It is an issue area in which traditional sources of power or coercive measures are of relatively little use in inducing "weaker" states (e.g., economically less developed countries) to join and comply with an agreement, and in which only a few such states--e.g., heavy polluters--often have veto power in that their non-cooperation could render a treaty ineffective. It is also an issue area in which existing applicable rules of international law--for example, principles of good neighborliness and equitable utilization of shared resources--do not stipulate specific obligations or measures on the part of states, but at best provide an obligation and a framework for states to negotiate agreement on concrete and effective actions (Gündling, 1991; Brunnée, 1988).

Secondly, negotiations over acid rain, like many other environmental problems, involve continuous and frequent encounters between parties over a longer time period. More than one-time bargaining situations, they thus build up expectations about fair behavior and the nature of fair alternatives. As well, acid rain talks involve highly valued and scarce resources; ethical issues; and benefits, costs (burdens), and risks which affect parties unequally, and which are indivisible or at least not easily redistributed. In international relationships with any one of these characteristics, concepts and issues of fairness tend to figure prominently (Albin, 1993).

Thirdly, sharp asymmetries between parties contribute not only to the prominence of fairness issues, but also to the divergences in parties' perceptions of fairness. In acid rain negotiations, these asymmetries concern notably wide differences in contributions to the problem between heavy polluters (e.g., Poland, Germany, the UK) and countries which are predominantly importers of air pollution (e.g., Sweden, Finland, Norway); in sensitivity to and costs suffered due to acid rain (given the nature of countries' ecosystems, proximity to polluting sources, and so forth); in dependency on and gains to be derived from regulatory agreements; and in economic, technological, and political ability to accept and implement control measures.

One may usefully speak of four, partly overlapping types of fairness issues, all of which play a role in acid rain and other international environmental negotiations to different degrees. *Structural fairness* concerns the overarching conditions and constraints within which the

negotiation process unfolds--e.g., the identity and representation of participating parties, ways in which issues are linked (or de-linked) on the agenda, and features and established rules of the negotiating site or forum. *Process fairness* refers notably to ways in which parties relate to and treat each other as they negotiate and build agreement (e.g., refrain from the use of "unfair" deceptive or coercive tactics). *Procedural fairness* concerns the characteristics of specific mechanisms such as problem-solving techniques, reciprocation, and random methods used for arriving at an agreement--e.g., their tendency to demand equal concessions, give equal chances to parties to "win", or to produce fair outcomes. *Outcome fairness* refers to the principles underlying the allocation of benefits and burdens in a negotiated agreement, and the extent to which this allocation (agreement) is considered just and reasonable in the longer term--for example, in view of unforeseen developments such as new scientific information (Albin, 1992, 1993). Important structural and process fairness issues in environmental negotiations today include how the interests of future generations should be measured and who can represent them properly (e.g., states as is the case today, or a formal transnational body), so that problems are not resolved in ways that subordinate these interests to those of the present generation.

Multilateral negotiations over transboundary air pollution controls in Europe first got underway in the mid-1970's, driven by Sweden which had proved that foreign sources of SO₂ emissions were primarily responsible for the acidification of its lakes. The 1979 Convention on Long Range Transboundary Air Pollution (LRTAP), signed by 32 states and the European Community (EC) within the UN Economic Commission for Europe (UNECE), established only the vague obligations to limit and, "as far as possible," gradually reduce and prevent transboundary air pollution. Yet the LRTAP Convention, together with EC environmental legislation, have provided the main frameworks for subsequent negotiations over specific controls on and reductions in SO₂ and NO_x emissions. These include the negotiations resulting in the adoption of the 1985 Helsinki Protocol, the 1988 Sofia Protocol, and the 1988 EC Large Combustion Plant (LCP) Directive, among other agreements. Generally speaking, the overall structure, process, and procedures of European acid rain negotiations are today well-established and accepted.

By contrast, fairness issues relating to the *outcome(s)* of these talks in the near and longer term are at the very heart of the negotiations themselves, and may well prove intractable. In the now ongoing negotiations on a new sulfur protocol within the UNECE-LRTAP Convention in Geneva, the tendency is to consider emission reductions based on the varying sensitivities of the ecosystems to acid deposition (Klaassen, Amann & Schöpp, 1992). While

promising to be more effective environmentally and economically than uniform reductions, if indeed possible to eventually agree upon and implement, this approach highlights the grossly unfair distribution of benefits and burdens among parties which may result from emission regulations. The burdens notably concern the high economic costs of investing in technologies and measures to abate acid rain, but also social and political costs. The benefits, more difficult to assess with any precision, include lesser damage to forests, agricultural crops, freshwaters and fish production, human health, and buildings.

Of course, fairness is not the only major factor explaining the dynamics of acid rain negotiations, nor is it the sole criterion on basis of which countries will judge the overall wisdom and acceptability of a particular outcome. For example, pure self-interests in emission controls, veto coalitions formed on basis of these, and redefinitions of such self-interests in countries such as West Germany, France and Italy due their own experiences of acid rain damage and new scientific evidence, have certainly contributed extensively to the impasses and breakthroughs in the process toward specific agreements on emission controls (Porter and Brown, 1991). Fairness arguments are used by parties for tactical purposes as well. Yet the increasing dependency on emission control agreements has required many European countries to enlarge their individual cost-benefit analyses to include the other sides' perspectives on fair and acceptable options. Indeed, the acid rain problem involves unusually clear-cut fairness issues --who should have to reduce emissions, by how much and what time, and at whose cost, given countries' disparate situations and resources -- lends itself particularly well to studying the role of "genuine" notions of fairness in negotiations. The discussion here will focus on parties' divergent concepts of *outcome* fairness in major European acid rain negotiations to date, as reflected in their positions and proposed emission abatement strategies.

3. Fairness Principles for Tackling the Acid Rain Problem

There are three major principles of outcome fairness in the allocation of resources and burdens, discussed extensively in the social-psychological (experimental) and negotiation literature: *equality, equity, and need* (Deutsch, 1975; Leventhal, 1976). Major positions and proposals advanced regarding emission reduction strategies in Europe emerge clearly as direct examples or variations of these three fundamental understandings of distributive justice.¹

¹ Kasperson (1983, chapter 15 in particular) discusses the applicability of these principles to issues of outcome fairness in radioactive waste management.

Other norms of outcome fairness with little, if any, applicability to acid rain negotiations include "no-envy" or "superfairness," which holds that a certain allocation is fair if, and only

3.1 Equality

Originating in the Enlightenment and the philosophy of Jean-Jacques Rousseau, the principle of equality, also termed "impartial justice," holds that parties should receive the same or comparable rewards (costs), irrespective of their contributions or needs (responsibility for the problem at hand). Specific interpretations of the norm include "equal shares," which divides resources, gains or costs in equal amounts between parties; "compromise 'in the middle'," which splits the difference between parties' initial positions (yielding a different outcome than equal shares unless opening positions are identical); "equal excess," which allocates resources to each party corresponding to the value of its best alternative to a negotiated agreement, plus half of the remaining resources (Komorita & Kravitz, 1979); and "equal sacrifice," which holds that parties' concessions should make them suffer equally (Pruitt, 1981). The principle often poses problems such as determining what is to be treated equally, how to apply it to indivisible or heterogeneous goods, and how to assure an outcome of actual equality when parties are very unequal in some respect. Yet it is frequently applied in arms control, environmental, and other international negotiations (see, for example, Druckman and Harris, 1990; Zartman et al., forthcoming), and particularly when parties view themselves as roughly equal in relevant forms of power.

There are at least two major explanations for the frequent resort to the equality principle in negotiations. First, it converges with common, intuitive ideas about "intrinsic" or "impartial" fairness (e.g., "all people or countries should be treated the same"), and enjoys wide acceptability as a basis for concession-making which produces fair compromise agreements. Secondly, the equality principle is characterized by relative simplicity and lack of ambiguity both in concept and application. Thus, more than other norms, the equality principle often helps parties to reduce competition, coordinate expectations and concessions, and reach compromises in ambiguous negotiating situations in which different fairness principles and alternatives are advocated; and to justify and sell the outcome to important constituencies. Experimental

if, no party prefers the other's share of the (disputed) resources to its own (Foley, 1967; Baumol, 1987); *retribution* ("punitive justice"), which says that a party guilty of some wrong in the past should be accorded fewer resources (gains); *the priority principle*, according to which the "winner", while determined proportionally (e.g., through a lottery or voting), gets more than a proportional share of the resources; and *subtractive justice*, according to which the disputed goods are taken away from both or all parties (which can also be understood as a form of equality; i.e., equal treatment of parties). *Precedent*, whereby a previous comparable case or decision serves as the rule for determining allocations in the outcome, may be applicable in some respects to acid rain but not as the sole distributive criterion.

findings suggest that parties are likely to reach agreement faster/an agreement of greater stability and at a faster speed if they seek an outcome based specifically on equality.

These factors are certainly significant in explaining the widespread reliance on equality in European proposals, negotiations, and agreements regarding acid rain to date. In a situation of diverse and apparently opposing positions between countries on fair and acceptable emission abatement controls, there has clearly been pressures, increasing willingness and moves toward endorsing typical equality alternatives -- notably ceilings on, and freezes and equal percentage reductions in, current SO₂ and NO_x emission levels with fixed time frames. Calls for such agreements were first made, unsuccessfully, by net importers of acid rain -- notably Sweden, Finland, Norway, and Canada -- in the mid-1970's. However, the March 1984 formation of the "30 Percent Club" -- a group of originally nine West European states and Canada committing themselves, among other things, to unilateral cuts of at least 30% in their 1980 levels of SO₂ emissions over a ten-year period -- became a symbolically significant act which created political pressures on other countries to follow suit and, notably, a standard viewed as fair against which they would be evaluated. Six months later, another eight West and East European countries joined the Club (Regens and Rycroft, 1988).

The 30 Percent Club set the stage for the talks leading to the 1985 Helsinki Protocol on the Reduction of SO₂ emissions. It was signed by 21 states -- including several heavy polluters such as West Germany, the Soviet Union, Italy, and France which previously had vetoed proposals for specific emission controls. In these negotiations, across-the-board 30% cuts in SO₂ emissions by 1993, based on 1980 emission levels, emerged again as the fair and acceptable formula to most participating countries among the many divergent positions advanced.² A major hurdle in the talks was the U.S.' and Great Britain's argument that an earlier base year be selected so as to credit them for their emission reductions prior to 1980, thus requiring insignificant or no further reductions of them. Most participating countries, viewing these pre-1980 reductions insufficient environmentally, rejected the demand as unfair, and the Protocol was not signed by three major exporters of acid rain -- Poland (for its lack of abatement technology), the U.S., and the U.K. (Gründling, 1991). Yet at a later EEC environmental meeting the U.K. suggested the same idea of a uniform 30% reduction in SO₂ emissions by 1993 (Regens and Rycroft, 1988), a demonstration of the then widespread

² See "Positions and Strategies of the Different Contracting Parties to the Convention on Long-Range Transboundary Air Pollution Concerning the Reduction of Sulphur Emissions or their Transboundary Fluxes," August 6, 1985. Document ECE/EB. AIR/7.

consensus on the equality principle as the basis for multilateral compromise agreements on emissions control.

The intrinsic appeal, simplicity, and explicitness of the equality principle are important advantages in any negotiating situation, and not at least in complex international environmental negotiations over problems such as acid rain. Yet one may question whether the outcomes it produces are necessarily fair or impartial in any meaningful sense of the word, both theoretically and in real cases. There is good reason to do so particularly when parties' conditions or positions are very unequal, as also noted in the negotiation literature (Iklé, 1964; Schelling, 1960; Druckman and Harris, 1990). These inequalities may concern, among others: resources available to tackle the problem; past and current responsibility for it and thus entitlements to the resources at stake (e.g., clean air, emissions permits); and worth attached to resolving the problem. Is it really fair to demand equal sacrifices from, or impose equal costs on, rich and poor countries, and on heavy polluters and victims of air pollution?

Virtually all these inequalities exist in the European acid rain problematique. A first major problem with typical abatement strategies based on equality is the absence of objective criteria to select a required percentage reduction or ceiling, a particular year on basis of which reductions will be made or the ceiling/freeze imposed, and a target year by which the requirements are to be achieved (Haigh, 1989). No matter what percentages or years are selected they are bound to be arbitrary -- for example, in failing to account for parties' degree of responsibility for the problem in terms of past emissions reductions and past or current emissions levels.³ Further, the approach discourages parties from undertaking additional, unilateral emissions reductions. Another major problem concerns the widely different costs and net gains which countries will experience to achieve the same reduction or limit by a given year due to their disparate economic, technological and other conditions to use or develop emission control techniques -- whether "add-on" technologies (e.g., use of low sulfur fuels, desulfurization of fuels, limits on industrial emissions), the development of alternative energy sources, energy conservation, or other abatement strategies. Many polluting countries, among them Eastern European, which are thus required to undertake the greatest reductions in

³ "Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on the Reduction of Sulphur Emissions or Their Transboundary Fluxes by at least 30 Percent (July 8, 1985)." In *Executive Body for the Convention on Long Range Transboundary Air Pollution*. Report of the Third Session of the Executive Body, United Nations Commission for Europe, U.N. ECE Doc. ECE/EB.AIR/7, Annex 1, August 6, 1985.

absolute terms are also those with the lesser resources to do so -- particularly in view of their economic and other pressing needs.⁴ Environmental drawbacks with the equality principle include its relative inefficiency in imposing the same requirements on countries irrespective of the sensitivity of their ecosystems and their pollution levels, its limits on total national emissions which do not target specifically transboundary emissions, and the need to regularly negotiate agreement on new time-bound ceilings or percentage reductions.

Equality abatement strategies to date can be viewed as a significant first step, which contributed to real reductions in national acidifying emissions and to a net 15% decline in overall emissions in Europe since 1980. Numerous countries achieved the 30% target of the Helsinki Protocol before 1993 (see Klassen, Amman and Schöpp, 1992). Yet, the practical implications of implementing the principle as done so far render it unsatisfactory from a fairness and economic perspective and insufficient from an environmental perspective. Thus considerable support for the equality principle as a basis for emissions reductions appears now to have given way to calls for new approaches which better account for the diverse environmental, economic and other conditions of states.

Nevertheless, proposals for abatement strategies based on variations of the equality principle are still being made. For example, the "equally shared responsibility" variant holds that countries exporting acid rain should pay for half of the damage caused in the importing country, and the latter for half of the emission abatement costs of the former (OECD, 1976). Theoretically, the concept of equality as *equal net gains* or *costs* --i.e, parties should, given their disparate circumstances and the value of their best alternatives to a negotiated agreement, gain to about the same extent from any regulatory agreement -- appears fairer and more promising in eliciting the necessary cooperation for advancing acid rain negotiations. Yet in practice these particular understandings of equality pose the complex problems of estimating the costs of acid rain damage and abatement.

⁴ For example, under current national reduction plans, Poland will undertake a 37% reduction of its SO₂ emissions (3210 kton in 1990) at the cost of 0.31% of its GDP annually, and Ukraine a 56% reduction in its SO₂ emissions (2782 kton in 1990) for 0.44% of its GDP, by the year 2000 compared to 1980. By contrast, rich countries with very low SO₂ emission levels, such as Switzerland (62 kton in 1990) and Norway (54 kton in 1990), will be able to undertake 50-52% reductions by 2000 compared to 1980, at the cost of 0.01% and 0.09% of their GDPs, respectively (Klassen, Amann and Schöpp, 1992. See also Klassen, Amann and Schöpp, 1991).

3.2 Equity

Originating in Aristotle's notion of justice as rooted in "balance" and "proportion," the equity principle holds that resources (rewards, burdens) should be distributed proportionally to relevant contributions (inputs). Fairness is achieved when each party's ratio of contributions to rewards (burdens) is the same, and injustice is experienced in relation to these ratios rather than in absolute terms. Relevant contributions may be qualities and endowments (e.g., status, power, skills, wealth, intelligence), or actions and efforts (e.g., hours worked, tasks completed or responsibilities held). In Homans' (1961) notion, fair division is accomplished when net rewards (goods received in an exchange; i.e., money) are allocated in direct proportion to investments (contributions to the exchange; i.e., time spent, risks taken), so that the ratio of profit to investment is the same for everyone. Similar concepts of equity are found in Adams (1965) and Walster, Walster and Berscheid (1978). The "opportunities norm," according to which each party receives resources (burdens) proportionally to how efficiently it can use or benefit from (carry) them, can be viewed as a variation of the principle which equalizes fairness with a form of efficiency.

Although frequently applied in international negotiations, particularly when parties recognize that they are unequal in resources, the equity principle is probably the most ambiguous. The nature of relevant contributions and means to measure their relative value, and the worth (weight) of the resources (burdens) to be distributed and the proper proportionality between contributions and rewards (costs), must be agreed upon. In the European acid rain problematique, the equity principle is reflected in proposed strategies (as well as in the EC's 1988 Large Combustion Plant Directive, discussed below) which allocate emissions reductions or abatement costs proportionally, or in a rough proportional relation, to a number of different criteria ("contributions" deemed most pertinent). Among these are: ability to pay as defined by e.g. total national income or national income per capita, so that all countries' gross or net abatement costs may be the same relative to their GDPs; ability to undertake reductions, as defined by e.g. countries' current emissions levels so that these are all cut proportionally by the same value; willingness to pay, as indicated by e.g. the abatement control costs which countries are prepared to pay under their current emissions reductions plans⁵ ; responsibility for the

⁵ Note that this tool may yield distorted measurements in assuming that every country also has the *ability* to pay what it is willing to pay (e.g., it may underestimate willingness to pay for emissions reductions in economically weaker countries).

For an example of how this norm may be applied, see "Economic Principles for Allocating the Costs of Reducing Sulphur Emissions in Europe." Report submitted by the delegation of the Netherlands to the Group of Economic Experts on Air Pollution, Executive Body for the

problem in terms of emission levels (current and/or past)⁶; and the degree of sensitivity of each country's ecosystem(s) to acid deposition.

The lengthy, difficult negotiations leading to the adoption of the 1988 Sofia Protocol on the Control of NO_x Emissions could be viewed as evolving primarily around conflicting positions on fair and acceptable abatement strategies. These positions caused impasses, prevented agreement on specific reductions, and eventually resulted in an agreement reflecting a combination of norms and, foremost among them, equity. On one hand, a group of five countries -- Austria, the Netherlands, Sweden, Switzerland, and West Germany -- insisted on a uniform 30% reduction in NO_x emissions by 1994. On the other, the United States demanded credit or some exemption corresponding to its emissions reductions prior to the suggested referent year of 1985 (Fraenkel, 1989). The final document, signed by 25 industrialized states (including some East European countries, the United States and Canada), was a mixture of compromises and norms. A flexible application of the equality principle was reflected in the Protocol's call for a freeze in countries' NO_x emissions by the end of 1994, using as the baseline year 1987 or any previous year, thus leaving room for crediting pre-1987 emissions reductions. In case a country selected a year prior to 1987, its average annual NO_x emissions in the period 1987-1996 must not exceed its 1987 emissions levels.⁷ Twelve parties to the Protocol committed themselves, in addition, to unilateral 30% reductions in their NO_x emissions.

Convention on Long-range Transboundary Air Pollution, UN Economic Commission for Europe, for the 5th Session, Geneva, 26-28 June 1989. EB.AIR/GE.2/R.26, 19 May 1989.

⁶ This is one understanding of the "polluter pays" principle, according to which each country's share of the costs of emissions reductions in Europe as a whole (to reach specified target loads at the lowest possible costs) should be proportional to its own level of emissions in a selected reference year (see "Economic Principles for...", cited above). Another version calls for polluters to pay for abatements costs in proportion to their financial ability (e.g., GDP per capita). However, the most common understanding is that the producers of pollution should pay the *total* costs of abatement measures so that, among other things, the costs of pollution and environmental protection are reflected fully in the market prices of "polluting products" and not imposed upon taxpayers, governments, or society as a whole. The polluter pays norm is widely accepted in principle by the OECD members (see OECD, 1972) and other countries, but so is the reality that many states may have to be exempted from it for a transitional period for financial or other reasons.

⁷ "Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes (November 1, 1988)." (Reprinted in *Register of International Treaties and Other Agreements in the Field of the Environment*, 1991.)

The distinguishing feature of the Sofia Protocol, however, is its general endorsement of the principle of equity as the basis for further negotiations and agreements on NO_x emissions reductions -- accounting for countries' varied conditions and circumstances in economic, ecological, technological, environmental and other terms. A specific equity criterion endorsed as a basis for determining emissions reductions for each country is "critical loads;" i.e., deposition levels for sulfur and nitrogen above which "significant harmful effects" on specified sensitive elements of the environment do not occur "according to present knowledge."⁸ Thus differentiated percentage reductions would be called for, in relation to the sensitivity of the ecosystem(s) of each country (see, for example, Amann, 1989). The approach could be viewed as an application specifically of the "opportunities" norm, in seeking to allocate reductions in a way which maximizes its environmental value or impact.

In subsequent discussions within the ECE, two specific equity criteria in addition to "critical loads" were recognized as the proper basis for negotiating new protocols on SO₂ and NO_x reductions: the relative costs of reducing emissions in different countries; and the relative contribution of a given country's emissions to acid desposition in other countries, or "source-receptor relationships" (Shaw, 1993).⁹ A number of scenarios for emission reductions based on these criteria have been presented, notably in the context of the UNECE Working Group on Abatement Strategies. Used in these are integrated assessment models which link information about energy use, costs and impacts of emission control strategies, long-range atmospheric transport and deposition, and its effects on sensitive elements of the environment (e.g., freshwaters and fish, forests).

In one scenario using the Regional Acidification Information and Simulation (RAINS) model, the objective is to reduce sulfur deposition to the 50 percentile critical sulfur deposition levels at a minimal cost to Europe as a whole. 3% of European ecosystems would then be exposed to deposition above the critical sulfur desposition values when accounting for current national reduction plans, compared to 18% with the latter alone. However, the *distribution* of required

⁸ Ibid., article 1, paragraph 7. It is presently not possible to reach critical loads everywhere, even if the best available abatement technologies were used (see, for example, Klaassen, Amann, and Schöpp, 1992). In practice, countries have agreed to negotiate "target loads" which also account for technological capacities, economic control costs, and social factors (Wüster, 1992). These targets will presumably approach critical loads over time.

⁹ See also "The Critical Load Concept and the Role of Best Available Technology and Other Approaches." Report of the Working Group on Abatement Strategies, September 1991. Economic Commission for Europe EB.AIR/WG.5/R.24/Rev.1.

emissions reductions (ranging from over 90% compared to 1980 levels in some countries, to possible emission increases in others) and control costs (ranging from 1.74% of GDP in Poland, whose costs would increase about 560% compared to its foreseen national reduction costs, to no or a negligible cost in several other countries) is dramatically uneven between countries (Klaassen, Amann, and Schöpp, 1992). Some of the greatest beneficiaries of the controls would incur virtually no additional costs, while the heavy burdens carried by other countries would not always be offset by comparable (or any) environmental improvements for them on a national scale.

The adoption of the Sofia Protocol marked the beginning of turn toward equity criteria as an important and widely accepted basis for distributing SO₂ and NO_x emissions reductions and control costs. It is a response to the shortcomings of and criticisms directed against the equality approach, as reflected notably in the Helsinki Protocol -- particularly in failing to account for countries' varied conditions and thus to be environmentally effective or cost-effective. As put simply by one analyst, "...control actions that are not driven by the damage existing in the environment cannot ensure that the environment is protected" (Fauteux, 1991) -- a serious drawback of equal percentage reductions and similar approaches which the critical loads standard, as an *objective and fair criterion in terms of environmental quality*, addresses directly. This approach would naturally tend to impose greater percentage reductions on heavily polluting states, save states with excessive pollution control costs from undertaking extensive reductions, and reward control and reduction measures undertaken previously. In addition, agreements based on critical loads, as a permanently valid standard, would not "expire" or require negotiations on new targets as frequently as those involving equal percentage reductions or ceilings.

However, while environmentally effective and economically efficient for Europe as a whole, equity approaches -- such as "critical loads," relative emission control costs, and source-receptor relationships -- fail to distribute these benefits and the costs among countries fairly in relation to commonly important criteria of evaluation. These include their GDPs, and their best alternative to multilateral emission controls (e.g., the environmental benefits already expected from national reduction plans, which may be less costly). In other words, these equity norms pose the same type of fairness problems as equality schemes with respect to *the final distribution of benefits and burdens*. While warmly supported by countries which are predominantly victims of air pollution (e.g., Sweden, Norway, and Finland), it would be difficult to win acceptance for these norms by a number of key (including heavy polluting) states, including the U.K. and the U.S. The need to assess and agree on the critical loads for different countries, and on effective and

acceptable strategies to achieve them, also promises to be a politically difficult and time-consuming process which may delay control measures considerably (Gründling, 1991).

3.3 Need (Compensatory Justice)

A third major principle of outcome fairness is need, also termed compensatory or redistributive justice. This principle stipulates that resources should be allocated proportionally based on the strength of need, so that the least endowed party gets the greatest share. Thus the norm sees no fairness in proportionality between contributions and gains, which rewards the already well-endowed, but in the *redistribution of resources in favor of an order based on equality*. According to Rawls (1971), resources important to achieve welfare such as liberty, education, and financial assets should be distributed to maximize the well-being of the weakest or poorest. The norm poses a number of challenges, such as: identifying, measuring and comparing relevant wants; revealing any tactical misrepresentation of true needs; and motivating more well-endowed parties to share their wealth. Among its strengths is the fact that the needs principle is relatively unambiguous. The range of potentially relevant needs is usually more limited than the attributes which could be considered pertinent contributions or important in applying the equality principle. The needs standard formed the basis of the United Nations negotiations on a New Economic Order and the European Economic Community's talks on the Common Agricultural Policy.

The needs principle underlies various "cost-sharing" schemes proposed recently for reducing SO₂ and NO_x emissions in Europe. Their point of departure is the reality of the need for and gains to be made from regional cooperation in speeding up the implementation of emissions reductions based on critical loads: National emission reduction plans cannot separately attain targets which are sufficient environmentally from the viewpoint of Europe and several individual countries; and national abatement strategies, if coordinated multilaterally, can be implemented at costs which are lower for Europe as a whole as well as for several individual states (thus encouraging these states to undertake further emissions reductions). The core problem addressed is the unfair distribution of gains and costs between countries which results from regional cooperation. While compensating states which will bear most of the abatement costs, these schemes address at least indirectly larger inequities or inequalities between countries, West and East European in particular --notably in economic development and resources, air pollution standards and control technologies, and environmental policies.

All cost-sharing plans are thus designed to serve as mechanisms redistributing financial (and sometimes technological) resources, so that the resulting outcomes are "fairer" in their distribution of burdens and benefits among countries than would otherwise have been the case if the same emission reductions were undertaken. The scope of the redistribution varies from seeking to simply compensate for the net losses suffered by some countries, to increasing or even maximizing the net gains of the most needy states in the spirit of Rawls (thus contributing to the establishment of equality among states in the long run). The rules for countries' contributions to and/or receipts from the pool of financial resources, however, are usually based on equity criteria.

One scheme suggests that GDP, GDP per capita, and national abatement costs determine countries' contributions to and receipts (compensation for emissions reductions) from an 'Acidification Fund' (Sliggers and Klaassen, 1992). Wealthy countries -- e.g., France, Germany, and the UK -- would, through the Fund, pay part of the costs of further emission reductions for poorer, polluting countries -- e.g., Poland, Ukraine, and Romania -- and have these countries cover a remainder of the costs themselves in proportion to their financial capacity (GDP per capita). However, while presumably enabling and motivating poorer, polluting countries to participate in the scheme, it does not address the issue of how to motivate its major financial contributors to do so -- something which would depend extensively on their perceived gains, in a narrower national context, from emissions reductions being undertaken abroad. In another proposal for a European cost-sharing fund, by contrast, the distributive criterion is indeed relative gains from cooperation in it (Bergman, Cesar, and Klaassen, 1992). All member states' perceived losses or gains from further emission reductions are estimated, based on their costs functions for additional reductions and deposition targets. They receive money from the Fund or contribute to it accordingly, as they are required to undertake certain emission cuts. Every member benefits from participation, but its total gains depend on the (stated) cost functions and depositions targets of other members.

Assuming a willingness on the part of key financial contributors and polluters to participate, cost-sharing schemes could permit larger emission reductions --in one estimate, an additional 24% reduction of the 1980 emission levels compared to national reduction plans¹⁰ -- which are at

¹⁰ "Economic Principles for Allocating the Costs of Reducing Sulphur Emissions in Europe," p. 6. Report submitted by the delegation of the Netherlands to the Group of Economic Experts on Air Pollution, Executive Body for the Convention on Long-range Transboundary Air Pollution, UN Economic Commission for Europe, for the 5th Session, Geneva, 26-28 June 1989. EB.AIR/GE.2/R.26, 19 May 1989.

once economically and environmentally effective, and fairer than other approaches in the final distribution of gains and burdens among countries. Without them, the extensive emission reductions needed particularly in Eastern Europe may prove futile in the context of new protocols on SO₂ and NO_x. Cost-sharing schemes do undermine the idea of countries paying for their own pollution, in accordance with the widely accepted Polluter Pays principle. Some countries may refrain from undertaking control measures they had otherwise planned or indeed could afford, unless rewards ("compensation") are forthcoming; or they may tactically underestimate abatement costs or exaggerate deposition goals. In any one of these cases outcome fairness is, of course, undermined. Nevertheless, there are numerous cases in which countries have found it more cost-effective to provide financial and technical resources and incentives for emission reductions being undertaken in neighboring states rather than at home, and additional such agreements are being discussed (Fauteux, 1991; Bergman, Cesar and Klaassen, 1992). These may eventually provide a springboard for more ambitious regional abatement strategies based, in part, on need and compensation.

4. Negotiating Fairness: Some Potential Strategies

4.1 Outcome Fairness as a Combination of and Balance between Different Principles

Outcome fairness in many real-world situations cannot rely on a single norm. It must involve a combination of and balance between a number of principles, often competing and yet apparently equally applicable, which account for a wider range of factors and circumstances than any single norm can possibly do. Many cases suggest that the more complicated the situation--e.g., in terms of involving highly valued resources, ethical questions, non-distributive burdens, or otherwise complex issues; and/or (numerous) parties with widely different resources or needs which are difficult to compare -- the greater the number of applicable principles which must be included and weighed carefully against each other. Some formulas for allocating public goods and burdens --e.g., organs for transplantation, military duty, and unwanted facilities such as prisons and waste dumps -- are illustrative in this respect. For example, the U.S. national formula for distributing kidneys among transplant patients involves a mixture of and balance between the principles of efficiency (likelihood of the transplant succeeding), need (urgency of a transplant) and compensation for disadvantages (medical ability to accept only a small number of kidneys), and seniority (amount of time waited to get a transplant) (Young, forthcoming).

In these cases, of which transboundary environmental issues such as acid rain is a prime example, parties and their constituencies often seem not to accept ready-made or simple concepts of fairness, or they regard their divergent fairness principles as "indivisible" in that a compromise cannot be struck between them. Thus parties are by necessity led into a search for a unique integration of a number of norms, which accounts for their respective situations. The resulting agreement, if successfully concluded, involves a complex formula which, in the beginning and throughout the negotiations, is all but obvious or prominent--but at the very core of the negotiations themselves.

In the search for agreement on new protocols on SO₂ and NO_x in Europe, the need for imaginative formulas which combine a number of fairness principles rather than rely on a single norm is obvious. The previous discussion pointed to how applications of predominantly one single principle have led to outcomes viewed as fair in limited respects only, and how more recent European discussions and proposals demonstrate a concern about including and balancing several norms. Clearly, future successful formulas for serious emission reductions are not likely to be based on simple understandings of fairness, such as "absolute equality", as also noted by a number of analysts (e.g., Haigh, 1989). More sophisticated approaches are warranted -- both as a means to bridge parties' divergent positions and fairness notions in negotiations and make agreement possible, and to deal more effectively with the complex problems at hand. One illustrative example, further discussed below, is the 1988 EC Large Combustion Plant Directive.

4.2 Overcoming Divergent Notions of Fairness: The Use of Problem-Solving Tools

The research literature to date, much of it experimental, has described the role of fairness -- specifically, notions of outcome fairness -- in negotiations as a facilitating and instrumental one: It helps parties to coordinate expectations and concessions, avoid constant confrontations and stalemates, and forge agreement in ambiguous situations of multiple alternatives (Lax and Sebenius, 1986; Schelling, 1960; Bartos, 1974). In other words, fairness is not negotiated -- fairness guides the negotiations. As already noted, however, in many real-world international cases parties typically hold on to divergent principles of fairness and/or interpretations of them which inevitably make them part, and often a central part, of the negotiations themselves.

In such situations, there are five ways in which an agreement can still be reached (Albin, 1993):

- o Parties may resort to a "fair procedure" for arriving at an agreement;
- o they may split the difference between their competing fairness principles;
- o the outcome may be based on the fairness notion of only one of them (e.g., in situations of

- power asymmetry);
- o parties may conclude an agreement for reasons other than fairness (e.g., redefine the problem as not involving [important] fairness issues);
- o they could move to a problem-solving ("integrative") mode of negotiation, in which new options may be created or discovered which combine concerns about fairness on both sides.

Specifically in negotiations over acid rain in Europe, and many other pressing environmental problems, the importance which parties attach to their respective fairness notions make it unlikely that any of the first four avenues will produce satisfactory -- if any -- agreements in the future. Successful negotiation will depend extensively on parties' willingness and ability to find new solutions which creatively integrate rather than compromise a number of divergent principles.

A number of analytical tools, alone or in combination, may aid and support parties in this process, particular prior to formal talks and when impasses have been reached. The literature has discussed some of these, which are relatively simple in concept, and pointed to their potential in inducing greater creativity, flexibility and more mutually gainful solutions, and helping to offset complexity and asymmetries in negotiations (Sjöstedt and Spector, 1993; Spector, 1993; Wagner, 1991). Unlike many resource-demanding "systems analysis techniques," they are already accepted and used to some extent, although implicitly and on an ad hoc basis, in international negotiations (e.g., Hare and Naveh, 1985; 1986) and do not depend on outside experts or intervenors for their use. This section begins to explore the potential usefulness of certain problem-solving tools in tackling divergent notions of outcome fairness held by parties, and their applicability to the case of European acid rain negotiations. The premise is that making the use of already familiar techniques more conscious and more systematic, and introducing new ones of a similar nature, could facilitate and enhance the negotiation process and its outcome considerably.

The following tools will be discussed: Cost-cutting, fractionation of the problem, the use of analogies, and linkage of issues.

4.2.1 Cost Cutting: The 1988 EC Large Combustion Plant Directive

Cost cutting (Pruitt, 1981) can be a decisive strategy in attempts to reconcile conflicting notions of outcome fairness in negotiations. The specific burden (e.g., economic costs, image loss, risks) involved for a party in making concessions or accepting a proposal permitting such a reconciliation is then reduced or eliminated, thus enhancing the party's perception of its fairness

and beneficialness without supposedly increasing significantly the costs of the other side(s). Whenever possible cutting costs may be preferable to attempting to provide compensation (related or unrelated) for costs incurred: The former is often considered "fairer," and complex negotiations over the nature and size of the proper compensation may be avoided. Parties often attempt to cut each other's costs as a means to elicit concessions, but outside actors may also intervene or parties may find ways to reduce their own costs.

An illustrative example is the negotiations resulting in the European Community's Large Combustion Plant (LCP) Directive of 1988. Much of the eventual success of these difficult talks, dominated by the opposing British and German positions, can be attributed to the adoption of a sophisticated approach which accounted for states' varied situations and cut the costs involved for key countries in agreeing to various stipulations. The initial drafts of the Directive were modeled on German legislation, and called for emission limits based on best-available technology only (Haig, 1989). Among other reasons, these won the support of environmentally activist countries for removing the unfair conditions of competition (and unfair allocation of emission reduction costs) created by their higher and costly environmental protection levels (Boehmer-Christiansen and Skea, 1991). The formal 1983 EC Commission proposal over which negotiations began, however, ended up calling for equal percentage reductions from all member states: a 60% reduction of SO₂ emissions, and a 40% reduction of emissions from NO_x and particulate matter, from large combustion plants by 1995 based on 1980 emissions. The United Kingdom, supported by less industrialized states such as Spain and Ireland, found these suggestions one-sided and unfair in failing to account for, among other things, the excessive costs of compliance involved for countries with high emissions and great dependency on the coal industry, and emission reductions undertaken in the 1970's and from smaller plants.

The ensuing stalemate was partly overcome by the Dutch introduction of the idea of widely different percentage reductions being undertaken by different countries, based on an elaborate set of criteria and considerations further discussed below. Among the provisions of the Directive as finally adopted were: All new power plants must be fitted with the best available technology for reducing emissions, thus emitting as little acid as technically feasible; reductions of NO_x emissions are to amount to 20% by 1993 and 40% by 1998, with adaptations to the conditions of individual states; and the UK specifically is to reduce its SO₂ emissions in two stages, to reach the 60% target by 2003. At least as importantly, a number of "exceptions" cut the costs of agreement particularly for less industrialized member countries and the UK. For example, the emission limits may be surpassed, or rediscussed and modified, under given conditions and/or for a transitional period due to excessive costs of control technologies, technological problems

with plants, difficulties with the use of indigenous and essential sources of fuel, and unforeseen and substantial changes in energy demand or the supply of certain fuels. Spain specifically is permitted to construct additional coal-fired electricity generating capacity with lesser controls until the year 2000.¹¹

In the history of European efforts to reduce acid rain through negotiation, the LCP Directive is significant particularly in two respects: its emphasis on the need for "comparable" (as opposed to e.g. equal) effort in view of countries' varied situations; and its demonstration of the possibility of reaching integrative agreements, even in a situation of deeply opposed interests, through techniques such as cost cutting over lowest-common-denominator compromises.

4.2.2 Fractionation of the Problem: The 1986 Dutch LCP Directive Proposal

Another technique is to attempt to make a problem more manageable and resolvable by breaking it down into its constituent parts -- a well-known approach discussed in the conflict resolution literature under different labels, including "fractionation" (Fisher, 1964) and "morphological analysis" (Spector, 1993). Often even large, complex and intractable problems are analysed too much as one monolithic whole. By analysing the components separately, and perhaps some of them in new combinations, additional or more promising possibilities for a solution may surface which would not otherwise have come to mind. In the context of this paper's subject matter, fractionation would foremost entail:

- o dividing the problem into elements reflecting the different key fairness issues involved, and
- o formulating a criterion for dealing with each of these elements, which accounts for parties' divergent situations and notions of fairness.

Again, the outcome would then usually reflect a combination of norms. It is exactly the opposite to the approach of attempting to reach agreement on a single fairness principle for the problem as a whole (e.g., in the case of acid rain in Europe, equality understood as equal percentage reductions in SO₂ and NO_x emissions).

In the EC negotiations over the LCP directive, the Netherlands in early 1986 (then holding the Presidency of the Council of Environment Ministers) submitted an alternative proposal to the EC Commission's original 1983 plan which illustrates to some extent the implicit use of this technique. Instead of the original suggestion for a uniform 60% reduction of SO₂ emissions in

¹¹ "Council directive on the limitation of certain pollutants into the air from large combustion plants." Commission of the European Communities (December 7, 1988), 88/609/EEC. Brussels: *Official Journal of the European Communities*, L336.

all member states by 1995, SO₂ emissions would be reduced first by 45% by 1995 and then by 60% no later than 2005 in the EC *as a whole*. The specific emission reductions required to achieve the initial 45% target varied widely among states, and were calculated based on criteria for a number of sub-issues. Among these were level of economic development and economic strength (e.g., impact of emission limits on industrialization, ability to pay for abatement technologies as measured by GDP per capita); contribution to and current levels of emissions; per capita energy use and thermal power plant use; and countries' current emission reduction policies (Boehmer-Christiansen and Skea, 1991). Although the Dutch proposal failed, the way in which it provided concessions to every party by fractionating the problem and balancing a number of concerns, notably about fairness, was very much reflected in the LCP Directive as finally adopted.

4.2.3 The Use of Analogies: Proposed Cost Sharing in a Global Warming Agreement

Recent research based on experiments, and examples from the international arena such as the preparatory talks on Mediterranean pollution, suggest that analogies may play a useful role in negotiations (Sjöstedt and Spector, 1993). Examining other cases which are comparable in some significant respect could help parties to reframe the problem and think more creatively about new alternatives for a solution, induce flexibility and break deadlocks, and enhance the prospects of a mutually beneficial agreement being negotiated successfully (Spector, 1992). Although a third party in a facilitating role may be needed to use this tool systematically in a problem-solving spirit, negotiators themselves may identify and refer to useful analogies based on their own previous experience and knowledge of relevant case.¹² In the case of European acid rain, past achievements in the same issue area may not provide enough useful ideas for future agreements. However, negotiations and proposals for negotiations over water pollution, the ozone layer, and other transboundary environmental questions can yield insights for how to tackle important aspects of the issue.

For example, the problem of negotiating a global warming agreement is analogous to that of European acid rain in terms of the difficulties of reconciling divergent positions on outcome fairness. These positions concern views on the proper distribution of necessary emission reductions of greenhouse gases (notably carbon dioxide, nitrous oxide, methane, and chlorofluorocarbons) and the resulting costs. A creative and illustrative proposal for a global

¹² Work on developing a database called ILLEX, which catalogues past successful integrative negotiations, is presented in McDonald (1988). Its purpose is to encourage creativity and agreement specifically in international river basin talks through the use of analogies.

warming agreement thus strikes a balance between the status quo and absolute equality during a transitional period: Rather than imposing equal ceilings on greenhouse gas emissions for all countries, irrespective of their current emissions, or accepting the (unequal) emission levels of today, the scheme stipulates emission reductions which impose about an equal degree of hardship from adjustment on the developed and developing countries, with the long-term objective of establishing an egalitarian regime. Further, compensatory justice is reflected in the suggestion for technological and financial aid to developing countries to facilitate their adjustment to the regime (Young and Wolf, 1992. See also Young, 1990/1991). Thus the proposal balances a number of considerations--including differences in responsibility for the global warming problem, in current emission levels, in ability to bear the costs of regulation, and in need.

4.2.4 Linkage of Issues: The Montreal Protocol

Linkage entails concessions being traded on differently valued issues. It facilitates an agreement by allowing a party to exchange concessions on its lower-priority issues, which to another party may be of utmost significance, for concessions on other issues it values more. In such a package deal, no party gives in extensively on any issue it views as critical, and each ends up with those items it needs or values the most. Linkage could be viewed as a form of non-specific compensation, whereby parties are "paid back" for their concessions in a different area ("currency") in which their needs are greater. Issues on the negotiating table may already be valued and prioritized differently, but new issues may also be brought into the discussions by parties or a mediator to permit linkages (Albin, 1993). The strategy stands in contradistinction to negotiating each issue separately on its own merits, or many issues in sequence and independently of each other. Analyses typically focus on its potential for facilitating agreement by exploiting differences on a wide range of matters -- e.g., interests, resources, capabilities, attitudes toward the passage of time and risk-taking, and probability assessments-- and thus *increasing mutual gains* (Sebenius, 1984; Lax and Sebenius, 1986; Raiffa, 1982).

As importantly, however, linkage may facilitate the creation of negotiated solutions viewed as *fair* by all parties. This is the case despite the fact that use of the strategy itself raises fairness issues which occasionally may become intractable: By grouping certain issues together on the negotiating agenda, the assumption is that legitimate trade-offs can be made between them, and such linkages may be used to mobilize one side's leverage over the other side and forcefully elicit concessions from it. In other words, in using linkage each party asks itself not only if the trade is beneficial, but also if it is "fair" in what it asks the party to compromise upon and what it offers in return for the sacrifice. For example, in negotiations over the siting of hazardous waste

storage facilities and compensation to affected (host) communities, it is commonly held that demanding these communities to make trade-offs between safety/health concerns and economic considerations is unethical and unfair. The exploration of possible linkages in negotiations, as "terms of trade," is often part of a joint search for a larger formula to define the problem and the guidelines for its solution.

To developing and less industrialized countries, linkages between transnational or global environmental issues and development issues is a central fairness concern. With respect to acid rain and global warming, for example, emission reductions would in many cases hamper their economic development for problems for which the industrialized world is mainly responsible. This claim has won recognition in the international community as being legitimate, and, even more, as being necessary if the adherence by the developing world to key environmental agreements is to be secured. An example illustrative of how linkage may have to be used in European acid rain negotiations to achieve the substantial emission reductions needed, not at least in less industrialized states, is the the talks leading to the adoption of the 1987 Montreal Protocol on Substances That Deplete the Ozone Layer. The negotiations on the final Protocol linked environmental issues (emissions reductions) directly to development issues (financial aid, technology transfers), and thereby reconciled fundamentally opposed positions into an agreement viewed as sufficiently fair by all parties. For the developing countries, an agreement must not penalize them for a problem caused essentially by the industrialized world. Indeed, at the heart of their notion of a fair solution was the principle of need -- of compensating them through technical and financial assistance and other special provisions for accepting regulation of emissions which, foremost among the costs involved, could hamper their development.

At the core of the North's notion of fairness was equity, expressed in the proposed reductions in emissions proportionally to current levels, thus accepting and preserving the North's much higher emission levels and keeping those of the South low. The final document was based on a combination of linkages and fairness standards so as to account for the varied notions and conditions of signatory states. Equity underlied the call for reductions in CFCs proportional to each country's 1986 emission level beginning in 1993, thus imposing a greater (unequal) cost of regulation on the industrialized states. Compensatory justice underlied the provision for financial and technical assistance to the South, and their exemption from the stipulated emission reductions during the first ten years for development purposes. Finally, the equality norm was expressed in the long-term goal of the North and the South sharing the cost burden of regulation on a basis of parity, and in the freeze on all countries' emissions at the 1986 levels for the first few years (1989-1993).

All the discussed tools could be usefully combined with a number of other problem-solving methods, particularly in non-binding settings away from the official negotiating table (e.g., in lower-level working groups) permitting open communication, sharing of information, and freewheeling exploration. They include: brainstorming, whereby a large number of options are generated but evaluated only later; attribution, whereby parties identify the essential features of a desired (fair, overall acceptable) agreement; and positions-interests(-needs) analysis, whereby parties analyze systematically more fundamental concerns underlying stated positions and priorities to widen the scope for alternative solutions.

5. CONCLUDING COMMENT

More recently the trend in European acid rain negotiations has been to move away from relatively simple understandings of fairness -- such as absolute equality -- toward the endorsement of a combination of standards. The negotiation process has become much more complex as a result. If successful, however, it promises to produce an outcome which is at once fairer in view of countries' diverse conditions and resources, and more effective in terms of the extent of emission reductions actually undertaken. The 1988 EC Large Combustion Plant Directive exemplifies that intensive problem-solving efforts in this area can produce agreements on substantial emission reductions which are more than lowest-common-denominator compromises, even in a situation of deeply opposed ideas about fairness.

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