The Control of Air Pollution and Acid Rain in Britain

ARMIN ROSENCRANZ*

The United Kingdom (U.K.) is both Western Europe's largest producer of SO₂ pollution,¹ and, with the small exception of Ireland, Europe's most "upwind" country. Prevailing winds bring Britain little pollution from the west, where the nearest industrial sources are thousands of miles away across open sea.² This same westerly air flow carries nearly half of Britain's industrial emissions across the North Sea and the English Channel to the countries of Northern Europe. According to recent studies, Britain is the largest single contributor to acid deposition in Norway, even larger than Norway itself,³ as well as the largest external contributor to acid deposition in Sweden.⁴


I am indebted to my former colleague, Gregory Wetstone, for editing and improving the original version of this article.

Readers of this article may be interested in consulting an earlier article by my colleague, Prof. (Dr.) P. Leelakrishnan, "Statutory Control of Environmental Pollution," in 3 C.U.L.R. 141 (1979).


3. Id., pp. 34, 37.

4. Swedish Ministry of Agriculture, Acidification Today and Tomorrow, prepared for the 1982 Stockholm Conference on Acidification of the

f. n. contd.
Ironically, British scientists have pioneered scientific understanding of air pollution and acid rain. More than 300 years ago, in 1661, John Evelyn wrote of the hazards of sulfur pollution in his book *Fumifugium.* British scientist Angus Smith first described the acid rain phenomenon in 1872 in his remarkable book, *Air and Rain: The Beginnings of a Chemical Climatology.* In this work, Smith provided detailed documentation of acid rain as an urban problem in the City of Manchester and briefly discussed damage to vegetation, fabrics, and building structures. Nearly 60 years later, researchers C. Crowther and H. G. Ruston duplicated Smith’s work in the city of Leeds, demonstrating gradients in precipitation acidity associated with coal combustion in the city’s center, and conducted pioneering studies on related damages to vegetation. Finally, it was in Britain that Eville Gorham, now Professor of Ecology at the University of Minnesota, published a series of papers beginning in 1955 that brought acid rain to the attention of the modern scientific community and first associated the phenomenon with distant, as opposed to local, air pollution. He correlated precipitation acidity in the rural English lake district with air pollution from fossil fuel combustion in distant industrial areas. And, with his colleague John Macbereth, Dr. Gorham first associated acid precipitation with aquatic impacts, relating the loss of

alkalinity in lakes and the heightened acidity of bog waters to acids in rainfall.\textsuperscript{1}

Recent reports indicate that areas of Britain regularly receive highly acidic rainfall.\textsuperscript{11} There have been reports that in Southwestern Scotland, an area of poorly buffered lakes similar to Southern Scandinavia, some lakes and bogs have been affected.\textsuperscript{12} But acidification impacts in Scotland and isolated areas of Britain have not been investigated in detail.\textsuperscript{13} To date, acid rain has not been an important subject of public interest or serious official concern in the United Kingdom.

Britain's historic leadership extends to governmental pollution control efforts as well. Britain was the first country to enact air pollution control laws. Its Alkali Act of 1863 was directed toward limiting emissions from the chemical industry. Originally the Act focused on alkali production, which gave rise to large hydrochloric acid emissions. The successor to the 1863 Act, The Alkali, Etc. Works Regulation Act of 1906,\textsuperscript{14} is still in effect today and defines the broad parameters of Britain's air pollution control regime.

SULFUR DIOXIDE POLLUTION LEVELS

British pollution control efforts have yielded substantial improvement in the nation's air quality. Aggregate SO\textsubscript{2} emis-

Sions declined dramatically in Britain in the 1950's, mainly as a result of strict pollution control measures mandated by Parliament and by local governments in the wake of a killer smog which caused thousands of deaths in London in 1952. New regulations sought to eliminate smoke in urban areas, and resulted in a drastic reduction in particulate emissions, as well as corresponding reductions in \( \text{SO}_2 \) pollution. More recently, aggregate \( \text{SO}_2 \) emission levels decreased by 24 percent between 1970 and 1980 to the current national total of 4.7 million metric tons. This improvement was mainly the result of decreased coal and oil combustion associated with Britain's economic downturn and the U.K.'s growing reliance on sulfur-free nuclear power. In addition, the U.K.'s pervasive use of all smokestacks has contributed to a dramatic lowering of the high ambient \( \text{SO}_2 \) concentrations associated with health problems in Britain. The Alkali Inspectorate recently reported that urban \( \text{SO}_2 \) concentrations have decreased by more than 60 percent in the past 20 years.\(^{15}\)

**Energy Policies**

The United Kingdom is heavily dependent on coal for power generation, perhaps more so than any other Western industrial nation. Roughly 70 percent of Britain's electric power is produced from coal and Britain's energy plans call for an indefinite continued reliance on the nation's ample coal reserves as a major energy source.\(^{16}\) Oil-fired and nuclear power plants supply the remaining energy in nearly equal proportions.\(^{17}\)

Surprisingly, Britain's North Sea oil supplies do not enter into the nation's energy plans in a major way. There are several

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reasons. British furnaces and boilers are not equipped to burn the light and fine North Sea oil. British refineries are adapted to Arabian heavy crude and similarly ill-equipped to refine North Sea oils. Additionally, Britain has come to rely on the profit and the balance of payments credit that accrue from selling its valuable North Sea oil on the world market. Because the supply of Arabian crude oil is uncertain and the cost could become prohibitive, oil-fired electricity production is expected to decrease in Britain in future years.

By contrast, nuclear power generation is likely to rise over the next decade. The amount of electricity generated by nuclear power is expected to more than double by 1990, and continue increasing into the next century.

AIR POLLUTION CONTROL IN BRITAIN

A series of British laws dating back over a century establish responsibility for pollution control. In addition to the Alkali Acts of 1863 and 1906, the principal national legislative measures relevant to SO\textsubscript{2} emissions control include the Clean Air Acts of 1956 and 1968 and the Control of Pollution Act of 1974. The overall control approach is mainly local in character. But the very large sources which contribute most to SO\textsubscript{2} pollution in the United Kingdom are subject to national emissions control requirements. Both the local and the national programs reflect a strong emphasis on cost-effectiveness.

The 1956 and 1968 Clean Air Acts focus on the control of particulate, rather than SO₂, emissions. They empower local authorities to control smoke, dust, and grit from industrial sources and private dwellings. These statutes are incidentally responsible for some SO₂ reductions, because local requirements under their authority frequently mandate the use of low sulfur fuels.

More directly relevant are the two Alkali Acts and the Control of Pollution Act of 1974. Under the Alkali Act of 1906, major industrial works, including all power plants, must be registered with the Alkali Inspectorate. Registering sources must demonstrate that the “Best Practicable Means” (BPM) will be employed to prevent emissions or to render them harmless. All other sources—that pollute less heavily—are subject to locally established control requirements under the Control of Pollution Act of 1974. This act also gives the national government the authority to impose locally enforced limits on the sulfur content of fuel oil.

The major British strategy emerging from this system for the control of SO₂ emissions from major sources is dispersion through tall smokestacks. Ancillary sulfur reduction strategies include the siting of pollution sources away from already polluted areas, the use of cleaner (lower sulfur) fuels, energy conservation, and the expanded use of nuclear power. Costly technological pollution control devices do not play a significant role. There are currently no flue gas desulfurization scrubbers under construction or in operation in Britain.


25. Alkali Act 1906, Part 1, S 2(1).


The Alkali Inspectorate

The Alkali and Clean Air Inspectorate is the national agency which administers control requirements for power plants and the larger industrial facilities. It was established in 1863, and is today the world's oldest and longest-running air pollution agency.28 A small and unified team of about 45 professionals, mostly chemists with industrial experience, the Alkali Inspectorate today governs emissions from 61 chemical processes and more than 2,200 plants.29

The Alkali Inspectorate is almost as conservative and traditional as its 19th century name connotes. Inspectors reportedly operate through cooperation with industry rather than confrontation. Whenever possible, they will strive to find ways to control air pollution more efficiently, rather than demanding that a source with pollution problems take costly abatement steps.30 In general, they prefer to avoid the public embarrassment to "registered" works that agency prosecutions would bring. The distaste for prosecution of pollution violators has been officially stated in the reports of two Royal Commissions nearly 100 years apart. In 1878 and 1976, the Royal Commissions endorsed the use of prosecutions only as a last resort.31 Although recent years have evidenced a greater attention to enforcement, it is note-


31. Royal Commission on Environmental Pollution, 5th Report, *Air Pollution Control: An Integrated Approach* (HMSO, London, 1976). But note that the Royal Commission of 1976 warned that "there is a danger that infrequent inspection by the controlling authority, together with a known reluctance to prosecute, will encourage some works to be careless in their attitudes of the day-to-day control of emissions."
worthy as a historical matter that in the years between 1920 and 1966, the Inspectorate brought only two prosecutions in response to industry violations. In contrast, seventeen prosecutions were successfully advanced in 1981.

"BEST PRACTICABLE MEANS" STANDARDS

Under the Alkali Act, all large industrial and power plants are required to employ the "Best Practicable Means" (BPM) available to control emissions. It is far from clear, however, exactly what this term entails. The Clean Air Act of 1956 provides a singularly unhelpful definition, explaining that "practicable" means "reasonably practicable, having regard, among other things, to local conditions and circumstances, to the financial implications and the current state of technical knowledge." In the establishment of control requirements, practicability is determined and applied on a case-by-case basis. It is a matter for the Alkali Inspector's judgment, taking into account the current state of technology, local economic, employment, and other considerations, and, of course, the costs of projected control measures. The standard ultimately established can be more than the numerical limit on emissions which most control requirements entail. The Inspectorate is authorized to actually direct sources to utilize specified operational processes.

The Alkali Inspectorate has provided formal "notes" to guide the establishment of BPM standards for particularly important categories of industrial polluters. The BPM notes offer emission standards, known as "presumptive limits," and suggest pollution reducing operational processes that new sources should utilize. The notes are designed, in part, to facilitate administra-

34. Clean Air Act 1956, S. 34.
tive efficiency. In court, the presumptive limit is “persuasive” but not legally enforceable. Significantly, despite the fact that BPM notes have been issued for more than 60 industrial processes, coal and oil-fired power plants—the largest category of SO₂ emitters—are not yet covered. These notes are “under development.”

The Alkali Inspectorate implements BPM requirements mainly through inspections when the major facilities apply for registration as new sources. Source-specific control requirements are usually the result of close Inspectorate discussions with industry, and often formulated with the approval of the industry’s trade association. Trade and economic considerations weigh heavily in the Inspector’s determination of best practicable pollution control. The Inspectors selectively inspect and oversee the 2,200 installations under their purview periodically after registration and are highly trained and reportedly thorough. Since BPM standards are periodically revised, existing sources can be required to retrofit controls to reflect technological progress and changes in the definition of what is “practicable.” But once a source is accepted for registration, annual renewal is rarely refused because of failure to institute better controls than those used at the outset.

TALL SMOKESTACKS

For powerplants outside of heavily urban areas, the Alkali Inspectorate has consistently defined BPM to require only the use of tall smokestacks to disperse emissions. Modern 2,000 megawatt (MW) power stations rely on chimneys about 200

36. Health and Safety Executive, Notes.
37. Haigh, supra n. 35.
40. U.K. Department of the Environment, Air Pollution Control, p. 15.
41. Alkali Inspectorate, supra n. 38.
42. Frankel, supra n. 39, pp. 10-13.
meters high to assure that ground level SO$_2$ concentrations near the source do not reach dangerous levels. 43

These large plants, for which the Alkali Inspectorate shoulders oversight authority, are responsible for an increasingly large share of Britain's aggregate sulfur emissions. Between 1960 and 1980, emissions from smaller emitters dropped substantially (as coal and oil combustion decreased), while emissions from high level emitters increased. According to the Inspectorate's 1981 annual report, high level emitters which released only about a third of the U.K.'s SO$_2$ pollution in 1960, now are responsible for more than 60 percent. 44

In its 1981 report, the Alkali Inspectorate defended the nation's often maligned tall smokestacks policies as both effective from a domestic standpoint and in line with control programs in use in other nations:

There is no doubt that in the light of present knowledge, this policy of dispersion has proved adequate to protect the U.K. environment. It is worth noting that although tall chimneys are often referred to in disparaging terms in international circles as the U.K. approach to pollution control, in fact every other industrial country has adopted similar policies for power station emissions. It is only more recently that alternative approaches have become available but even these do not dispense with the need for tall chimneys. 45

LOW SULFUR FUELS

In heavily industrialized areas where stacks cannot be constructed high enough for adequate dispersal, use of low sulfur fuel is the preferred alternate control strategy. Similarly, low sulfur fuels are the central means of reducing pollution problems caused by home heating where tall chimneys are generally not practical. 46

44. *Id.*, p. 21.
45. *Id.*, p. 22.
The only nationwide fuel sulfur limits in Britain are those required by the European Community "gasoil" directive of 1975. This directive mandates that light fuel oils not exceed a 0.3 percent sulfur content, except in specifically designated zones where a maximum sulfur content of 0.5 percent may be permissible.47

Environmental officials in Britain are not favourably disposed toward the establishment of nationwide limits on the sulfur content of other fuels, such as coal and heavy fuel oil, which are responsible for a much substantial portion of the U.K.'s SO₂ emissions. Such a requirement would deprive government and industry of their much-vaunted flexibility in energy choices.

Local governments, however, are empowered to establish such limits. In 1972, the local authority for London's historic and geographically small central business district, the City of London, restricted oil burned in new furnaces to a sulfur content of no greater than 1.0 percent. This move reflected the new wave of interest in London for air pollution control, founded mainly in concern over pollution-related damages to Westminster Abbey and other historic buildings. Local limits on fuel sulfur content may become more widespread in the near future in Britain as municipalities become more cognizant of possible pollution damages of their cultural heritage and, more concretely, as they seek to achieve the new European Community ambient standard for sulfur dioxide (discussed below) which is effective as of April 1, 1983.48

TECHNOLOGICAL CONTROL DEVICES

Coal washing is the only technological SO₂ pollution control approach widely practiced in Britain today. It is used principally to moderate the ash content of coal in the context of particulate control efforts. However, washing also has the


48. Hill, supra n. 18.
beneficial effort of lowering the sulfur content. The most effective, commercially practical SO$_2$ control technology, flue gas desulfurization (FGD), is not utilized in Britain. In the 1930's, however, the U. K. pioneered early emission desulfurization efforts. Flue gases from two London power stations were ‘scrubbed’ with innovative FGD systems using water from the Thames River. Although the devices worked effectively for many years, the plants, which are now closed, had problems similar to those affecting modern limestone scrubbers, including high operating costs, poor dispersion of the cold wet plume (plumes are now reheated), and damaging effects on the Thames.

Officials of Britain's Central Electricity Generating Board (CEGB), whose power plants are responsible for about 50 percent of the nation’s SO$_2$ emissions, are firmly opposed to the use of FGD technology. They claim that flue gas scrubbing would increase the costs of building a new 2,000 megawatt (MW) power station by $160-$240 million. CEGB officials also contend that scrubbers cause more problems than they relieve, displacing relatively harmless gaseous waste with more problematic solid waste (sludge).

British environmental officials have historically held a similar view. In refusing to require the installation of scrubbers on either new or existing facilities, they have stressed the technology's high cost, the potential for operating problems, sludge disposal difficulties, and the uncertain magnitude of the benefits of control.

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49. Coal washing can eliminate approximately 40% of sulphur, compared with up to 90% removal through the gas desulfurisation.


52. Id., p. 35.


In its 1981 annual report, however, the Alkali Inspectorate gave an unprecedented positive review of FGD and other advanced control techniques. The report explicitly cited the conclusions of a recent seminar in Salzburg, Austria which found that FGD could be considered a "feasible technology" for reducing emissions of sulfur dioxide by 90 percent or more at a cost of 10 to 20 percent of the power station's investment. The Inspectorate noted that FGD is already in use on many plants in the United States and Japan, and that West Germany has plans to use the technology on new facilities. Moreover, the annual report expressed official interest for the first time in other advanced technological approaches, including oil desulfurization, fluidized bed combustion, and improved coal cleaning techniques.

There is now a prospect that new sources in Britain may utilize advanced control devices. While the Inspectorate did not commit itself to requiring FGD or similarly effective technology on new coal or oil-fired plants (none are currently planned,) it did send strong signals that such a requirement was likely.

(T)he first duty of the Inspectorate is to prevent emissions to the air where it is practicable to do so . . . . In the United Kingdom, there are currently no proposals for new fossil fuel generating plants, but if and when they come forward, the scope for preventing or reducing the emissions of sulfur dioxide will need to be considered positively in light of experience now being gained in other countries.

**AIR QUALITY STANDARDS**

There is currently no national ambient standard for sulfur dioxide in Britain. But the new European Economic Community directive setting air quality standards for sulfur dioxide and suspended particulates goes into effect in April of 1983. It is

56. *Ibid*.
expected that sources will be able to achieve compliance with the modest standard through the usual tall stack and low sulfur fuel strategies. In some urban areas, local authorities may have to impose additional limits on fuel sulfur content. However, the Alkali Inspectorate now contends that pollution levels in most areas already decreased sufficiently in recent years to achieve nationwide attainment of the Community standard.

**PROSPECTS FOR NEW SULFUR DIOXIDE CONTROL PROGRAMS**

In its 1981 annual report, the Alkali Inspectorate also evidenced a heightened consciousness of the possible inadequacies of Britain's SO₂ control programs. With regard to SO₂ control, the Inspectorate noted that:

A number of factors, such as the introduction of air quality standards for sulfur dioxide, a greater future dependence on coal, the concern about transfrontier pollution and 'acid rain' and the emergence of reliable and commercial processes to prevent the emission of sulfur dioxide, make it appropriate to review the present position and possible future implications.

This new awareness, however, will probably yield little in terms of actual emission reductions in the foreseeable future. The only major policy change associated with the new attitude is that, as mentioned above, the United Kingdom is more or less committed to the installation of FGD in new fossil fuel-fired plants. While the symbolic significance of this policy shift is great, no new coal-fired plants are at present being planned in the United Kingdom. (The current emphasis in construction and planning of new power plants is on nuclear facilities. Because the United Kingdom intends to rely on use of its domestic coal well into the next century, if only to keep its miners employed, new

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58. Hill, supra n. 18; and Health and Safety Executive, *Industrial Air Pollution*, p. 20.
60. *Ibid*.
coal plants probably will be constructed in Britain, but not until well into the 1990’s). 62

As a strictly legal matter, the Inspectorate does not have the authority under present legislation to establish new control requirements in response to concerns surrounding long-range pollution impacts. BPM requirements are, in theory at least, founded entirely on technological and economic considerations, with no explicit attention to air pollution impacts. Additionally, the powers of the Alkali Inspectorate flow from legislation intended to protect the population of England and Wales. Domestic legislation does not authorize the agency to take action geared to control of international pollution and the protection of foreign environments.63

The Alkali Inspectorate does have the authority to redefine the BPM standards to reflect improvement in technological capabilities. Through this mechanism, it could demand that existing sources install more effective control measures. But, as mentioned earlier, such revisions are rare. While senior Inspectorate officials concede the possibility of some gradual tightening of SO₂ control requirements for existing sources, especially if a new and inexpensive technology were to enter the picture, they have made it clear that existing facilities would not be required to retrofit FGD technology.64

The Alkali Inspectorate considers FGD an “impracticable” technology for existing plants. According to officials of Britain’s Central Electricity Generating Board, a retrofit program would be prohibitively expensive, would require shutting down some powerplants for at least six months with the attendant loss of power generation and, in many cases, would not be possible because there is “rarely” room for an FGD addition to existing

62. Id., p. 37; and Health and Safety Executive, Industrial Air Pollution, p. 22.
53. Alkali Inspectorate, supra n. 38.
64. Alkali Inspectorate, supra n. 38; and House of Lords, Sixteenth Report, p. 40.
Nevertheless, power stations built in recent years have been required to leave sufficient space for the possible retrofit of FGD controls.

**The Central Electricity Generating Board (CEGB)**

The CEGB is, as explained above, the government agency responsible for producing most of Britain’s electric power. Proud of Britain’s historically advanced pollution control programs, CEGB officials are inclined to resist additional control measures as excessively costly and energy intensive. As spokesman A. J. Clarke put it, “The United Kingdom was the first country to become polluted and also the first country to clean up its pollution. Particulate pollutants have been reduced by 80 percent, and sulfur pollutants have been reduced by more than 50 percent. We believe we have behaved very responsibly in this area.”

In general, the CEGB denies any substantial responsibility for either the acidity of Scandinavian lakes and soils or for the remedy of that condition. To aid in assessing the British contribution to Scandinavian acid rain, CEGB scientists are using aircraft to track emissions from the Eggborough power station in Yorkshire, which have been injected with the distinctive tracer sulfur hexachloride. The CEGB’s Central Electricity Research Laboratory, in charge of this “flying chemists” program, hopes to clarify whether and to what extent SO₂ emissions are transformed to acid sulfates in the atmosphere, and where and in what form they return to earth. CEGB scientists are also in-

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vestigating the impacts of acid rain on soils and surface waters, and the effect of other pollutants, such as hydrocarbons, on the formation of sulfuric acid from SO₂.⁷⁰

CEGB officials have recently expressed concern about long-term European Community goals to establish new SO₂ control programs. In recent hearings, they maintained that the 1979 Convention on Transboundary Air Pollution calls for further scientific and technical research before the development of an international control policy. More rapid development of abatement programs would only slow progress toward an effective international approach to reduce transboundary pollution, according to CEGB spokesman, and would be contrary to the terms of the 1979 Convention.⁷¹

**Public Participation in Air Pollution Control Efforts**

The Alkali Inspectorate has been called a government agency with a “rare blend of expertise and unaccountability.” The Inspectorate has traditionally approached air pollution control matters with an attitude of exclusivity and secrecy toward the public, and an attitude of paternalism and partisanship toward industry.⁷² The Inspectorate’s preferred way of doing business was candidly betrayed in the agency’s 1968 annual report. “Abating air pollution is a technical problem, a matter for scientists and engineers, operating in an atmosphere of cooperative officialdom.”⁷³

“Cooperative officialdom,” as one might presume, provides little opportunity for public accountability. It has historically been official Inspectorate policy not to disclose information regarding almost any major aspect of air pollution from specific

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sources or information relevant to government control requirements. This includes information on the type or quantity of pollution from an individual plant, the emission standards applicable to an individual plant, the names of companies not in compliance with emissions standards, or even the names of companies prosecuted for violations.74

Originally, the Inspectorate claimed that confidentiality was needed to protect trade secrets. A decade ago, a Royal Commission discredited that claim, pointing out that pollution control processes were well described in available publications.75 In the years following the Commission report, according to one close observer, the Inspectorate has argued that publications of emissions data will confuse the public, provide ammunition to extremists in the environmental movement, waste Inspectors' time, reduce efficiency, and harm the trust that exists between the Inspector and the industry.76 In a 1976 report, the Royal Commission on Environmental Pollution concluded that the Inspectorate had "not sufficiently adapted to changes in society's attitude to pollution and to public accountability ...."77 Very recently, the Inspectorate has evidenced a slightly more enlightened attitude regarding information disclosure. The agency's 1981 annual report for the first time disclosed names of some pollution violators subject to enforcement action.78

ENVIRONMENTALISM IN THE UNITED KINGDOM

The United Kingdom has a tradition of environmental awareness and a large conservation movement represented by long established environmental organizations such as the National Trust and the Council for the Protection of Rural England. But

74. Frankel, supra, n. 28, p. 18.
75. Royal Commission on Environmental Pollution, 2nd Report, Three Issues in Industrial Pollution (London: Her Majesty's Stationary Office).
76. Frankel, supra n. 28, p. 18.
78. Health and Safety Executive, Industrial Air Pollution, pp. 2-3.
British environmental groups are more active in land use planning and nature conservation issues than in the pollution control area. Not surprisingly, their concern focuses more on wildlife protection and the expanded use of nuclear facilities in Britain, than on the loss of fish in Norway and Sweden.

Pollution issues have historically gained importance in the United Kingdom, as in other countries, when they are of local concern. Since local impacts from SO₂ pollution are scarce, the environmental constituency for more strict SO₂ control is limited. This picture could change in the not too distant future as the British population becomes more aware of acid rain impacts in Scandinavia, and learns of possible effects on lakes in Southwestern Scotland and isolated areas of the United Kingdom. British environmentalists are perhaps most likely to be prompted by increasing concern over pollution-related damages to buildings and other historic structures.

INTERNATIONAL EFFORTS TO CONTROL TRANSBOUNDARY POLLUTION

Having signed the 1979 Convention on Transboundary Air Pollution, and endorsed commitments to international environmental responsibility, such as the Declaration of the United Nations Conference on the Human Environment, the British are officially committed to the principle that nations must control pollution causing damage to a foreign environment. But they part company with the pollution importing nations where efforts to apply these principles to air pollution control in Europe are concerned.

The United Kingdom has been a leading Western opponent of Scandinavian efforts in international organizations to promote

79. Hill, supra n. 18.
adoption of multilateral abatement programs. When the 34 member nations of the U.N. Economic Commission for Europe met in 1979 to negotiate a pact on international pollution, the United Kingdom teamed with West Germany to lead the opposition to the pollution abatement programs supported by the Scandinavians. The two countries firmly refused to take part in any convention requiring a percentage rollback of SO$_2$ emissions, or imposing a ceiling which would prohibit increases in national pollution levels. Eventually, the Nordic countries settled for a less ambitious agreement lacking specific abatement requirements. Britain gave reluctant support to the Convention on Transboundary Pollution, signed in Geneva in November of 1979.

British officials have tended to emphasize the scientific uncertainties surrounding acid rain and its impacts. Until recently, they questioned the severity of the aquatic impacts in Scandinavia, the causative role of acid rain, and the existence of a connection between pollution in the United Kingdom and acid deposition in Scandinavia. More recently, they have founded their objections to Nordic proposals for abatement action in a somewhat more refined critique of the current scientific understanding. At international gatherings to discuss transboundary pollution, they have emphasized the uncertainty surrounding the transformation processes by which pollutant gases are converted to acid in the atmosphere, pointed to the possibly significant role of pollutants such as nitrogen oxides for which the United Kingdom is a less important source, and questioned the scope of the actual benefits in Scandinavia likely to flow from the abatement emissions in the United Kingdom.

83. For a detailed discussion of the high-level meeting and the development of the 1979 Convention on Transboundary Pollution, see Rosencranz, “The EEC Convention of 1979 on Long-Range Transboundary Air Pollution,” 75 A.I.L., pp. 975-782.
One of the strongest official British arguments against international controls is that, even presuming the accuracy of estimates finding the United Kingdom responsible for a substantial portion of Scandinavia's acid pollution, only a small fraction of emissions from the United Kingdom are actually deposited in Scandinavia (less than 10 percent, according to an early OECD study). Yet to reduce this fraction by half, aggregate United Kingdom emissions would have to be reduced correspondingly—a measure viewed as prohibitively expensive and not cost-effective.

The thrust of British diplomatic efforts in international forums has been to pursue more scientific research before the institution of any cooperative and costly new abatement program. British diplomats have dutifully followed this tack at all three international gatherings for discussion for European transboundary pollution issues: the Organization for Economic Cooperation and Development (OECD), the European Economic Community (the Community), and the Economic Commission for Europe (ECE).

Although they remain opposed to pollution abatement programs to deal with transboundary acid rain, the British have recently evidenced a somewhat more enlightened attitude regarding the nature and severity of the problem. In his official address to the 1982 Stockholm Conference on Acidification of the Environment, British Under Secretary of State, Giles Shaw, acknowledged that acid rain is a "grave" problem that has led to "substantial aquatic impacts" in Scandinavia. More significantly, the Chief Alkali Inspector, Leslie Reed, in his agency's 1981 annual report, conceded that the recent recognition of transboundary environmental problems "calls into question the adequacy of former national policies," and that "it is certain that in both Europe and North America acid rain will be seen as a major and pressing international issue over the next few years.,"

85. Clarke, supra n. 67.
87. Shaw, supra n. 84.
88. Ibid.
89. Health and Safety Executive, Industrial Air Pollution, p. 22.
But the Inspectorate also conveyed the basis for Britain’s continued opposition to international programs for greater control of SO$_2$.

Less is known about the effectiveness of remedial measures and there is doubt that widespread and expensive measures to reduce sulfur emissions (even if this were possible) would result in a significant improvement in the aquatic environment.

The slightly more sympathetic British position toward international pollution problems was probably a result of a number of factors including more extensive and reliable scientific information, and greater pressure from the international community. Britain’s position on these issues in Western Europe has become increasingly isolated. The United Kingdom was abandoned by West Germany, its influential ally in past European environmental disputes, when the discovery of pollution-related forestry problems prompted Germany to adopt a dramatically more progressive international stance supporting Scandinavia’s call for abatement action.\(^91\)

At present, the United Kingdom has the luxury of being able to voice its concern for Scandinavia’s problem and its willingness to participate in an international solution, without having to fear imposition of requirements to substantially reduce its emissions in the foreseeable future. The United Kingdom, very much aware of the limitations of the ECE as a forum for resolution of Western Europe’s pollution disputes,\(^92\) views the ECE Convention as the central focus of efforts to deal with transboundary pollution. At the 1982 Stockholm Conference, Britain’s spokesman made clear his nation’s intent to work through the ECE before considering alternate approaches.

90. Ibid.


92. Alkali Inspectorate, supra n. 38.
I am convinced the way forward lies under the Convention. If some countries wish to work outside the Convention, that must be their own decision. But any future international cooperative action must hinge on the conclusions reached after the work of the Convention has run its course.\textsuperscript{93}

The participation of Eastern European countries in the ECE renders the adoption of strict new international abatement programs in that organization extremely unlikely.

Britain has large reserves of coal on which it intends to rely to meet its energy needs for the foreseeable future. Modest SO\textsubscript{2} emission reductions can be expected in the United Kingdom as older, heavily polluting coal-fired plants retire in coming years, and as new nuclear power plants come on line. But large scale abatement is unlikely in the absence of either greatly strengthened international pressure (probably from the European Economic Community), or new scientific data clearly linking British pollution with substantial adverse health, economic, or environmental impacts in downwind countries.

\textsuperscript{93} Shaw, \textit{supra} n. 84, p. 8.