History of the European Union's Atmospheric Pollution Policy and Its Effect on Industry

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Introduction

Amid growing concerns over acid deposition and ozone thinning – resulting from pollutants released into the atmosphere by vehicular emissions, petroleum refineries, and power plants – the European Union's environmental policy is recognized as "one of the quiet success stories of the Community." [1] As a consequence of its unique power to create legislation binding upon member states without "further review or ratification," the European Union (EU) is the single governmental body with the greatest potential for taking effective action in Europe's environmental frontier.[2] Furthermore, ecological policy in the form of EU mandates (called directives) have influenced the direction and degree of Community integration, by establishing uniform industrial standards.[3] This gradual trend toward European integration is evident in the history of the Community's air pollution policy, and its effect on industries – within the member states. Daniel McGrory (attorney and environmentalist) corroborates this view by stating, "Community-level environmental policy development and implementation have depended on and reflected the progress and extent of European integration (particularly the Community's institutional development and the state of legal integration)."[4]

The development of an environmental objective, besides its positive ecological effects, was a remarkable step forward in the process of European solidarity that contributed substantially to the continued growth of the EU as a political system. However, in the beginning "environmental protection was not linked with the establishment and function of the Common Market in its role as an economic institution."[5] In fact, the Treaty of Paris 1951 (that established the European Coal and Steel Community) and the Treaty of Rome 1957 (known as the EEC Treaty), because it created the European Economic Community (EEC), do not expressly permit Community institutions to act in the field of environmental protection.[6] Furthermore, the Treaties do not contain the words environment or pollution. In light of this evidence, it is clear that the ultimate purpose of the European concordats was to create an economic community, by establishing a common market.

Reasons for the Establishment of a European Environmental Policy

Shortly following its inception (1958-1963), the EEC came to the realization that uniform pollution laws would eliminate unfair competition – between member states with no environmental standards and those with regulations that increased the price of production. This is pertinent since anti-pollution measures can account for between twenty and thirty percent of the costs of some industrial production processes, which has the potential to drive the price of goods higher. Since pollution control requirements varied between countries, this constituted a barrier to fair competition.[7] Considering that different national provisions concerning the design or composition of cars, fuels, or detergents were technical barriers to trade that could produce an unsettling effect on the Common Market, environmental regulations became important for economic integration.

Commerce verses the Environment

From 1964-1973, EEC environmental policy was incidental to measures to harmonize laws in order to abolish obstacles to trade between affiliated states. Therefore, at the level of Community policy, the Common Market was and to an extent continues to be the primary consideration of the EU, and environmental policy can be created only in the context of this higher authority.

That is to say, legislation to protect the environment is only acceptable to the extent that it does not interfere with the economic goals of the Union. [8] Without an initial environmental agenda, the pace was set by environmentally progressive member states (West Germany, Denmark, Luxembourg, and the Netherlands), who drove the Community into reacting to their stringent protectionist programs in an effort "to preserve balanced common market functioning."[9] For the most part, EEC policy initiatives were not based on a comprehensive political program. In reality, they were patchwork responses to national initiatives and were prompted by the need for harmonization to preserve or improve an economic institution. Moreover, an emphasis was placed on uniform product standards because differing industrial requirements and national initiatives (conferring unfair trading advantage on certain enterprises) had a direct negative impact on interstate commerce.[10]

Development and Evolution of Europe's Environmental Policy 1972-1990

The origins of Community environmental policy can be found in the United Nations Conference on the Human Environment held in Stockholm, Sweden, in June of 1972.[11] It was at this meeting that EEC member states formally agreed to the Declaration, Principles and Action Plan of the Stockholm Convention. The principles of the agreement can be broken down into six main groups. First, natural resources should be safeguarded and conserved. Specifically, the earth's capacity to produce renewable resources should be maintained, and non-renewable resources should be shared. Second, development and environmental concern should go together. Therefore, less developed countries should receive every assistance and incentive to promote rational environmental management. Third, each country should establish its own standards of environmental management. This allows nations to exploit resources as they wish without endangering the ecological balance of other states. Fourth, pollution should not exceed the capacity of the environment to clean itself, and oceanic pollution should be prevented. Fifth, science, technology, education, and research should all be used to promote environmental protection. Finally, there should be international cooperation aimed at improving the environment.[12]

The challenge of protecting the human environment, outlined by the Stockholm Conference, culminated in the creation of the first comprehensive European environmental policy. At the monumental Paris Summit of October 1972 (precursor of the European Council) the heads of state and government officially acknowledged the message of the Stockholm meeting. Furthermore, national leaders concluded that economic development had resulted in inequalities in living conditions within the Community, that the ecological basis of national development was threatened, and that more attention should be paid to social goals such as the quality of life.[13] The Paris Summit Communiqué "acknowledged that economic expansion was not an end in itself, but that economic growth should be linked to 'improvement in living and working conditions of life of the citizens of the EC.'"[14] This previous phrase, drawn from the Preamble to the Treaty of Rome, formed the foundation for the development of a European environmentalist platform.

The Paris meeting also directed the Commission to draw up a common EC environmental policy, and on November 22, 1973, the Council of Ministers approved an ambitious four-year Community Action Program on the Environment. This development is significant, in a historical sense, because it freed environmental legislation "from the objective of economic and commercial harmonization."[15] Specifically, the program designated three areas of activity: the reduction and prevention of pollution and nuisances, improvement of the environment and quality of life, and Community involvement in international organizations dealing with the environment.[16] Not all of the objectives were met in the first four year period, but there were three successive action programs.

The First Action Program (1973-1977) concentrated on reducing overall pollution levels. The Second Action Program (1977-1981) combined the principle of environmental considerations with economic policies. The Third Action Program (1982-1986) included proposals for environmental coordination and recommendations on EC foreign environmental policy. Furthermore, the project stipulated that the Community would continue to speak in various international organizations with a single voice, employing its "influence to ensure that plans drawn up at the international level, such as those of the UN Environmental Programme [sic] and the World Conservation Strategy . . . are actually implemented." It also discussed the importance of environmental protection as an integral part of developing future policy.[17] The Fourth Action Program, incorporated in the Single European Act (SEA) of 1987, provided a clear legal basis for action – by the EC – on the environment.[18] In addition, the SEA freed EC policy from the legal constraints implied by Articles 100 and 235.[19] Article 100 authorizes directives approved unanimously "for the approximation of such provisions laid down by law, regulation of administrative action in the member states as directly affect the establishment of functioning of the common market."[20]

Under Article 235 legislation not envisaged elsewhere is authorized if it is "necessary to attain in the course of the operation of the common market, one of the objectives of the Community."[21]

The Preamble and Article 2 of the Treaty of Rome declare that the "constant improvement of . . . living and working conditions" and the "harmonious development of economic activities" are Community goals. This affirmation was interpreted by the EC to mean the improvement of the quality of life, and thus the environment.[22] From the start, EC ecological policy (in the form of legally binding directives) was incidental to measures to harmonize national environmental laws in an effort to abolish obstacles to trade between member states. These initiatives include the Directive of 1967 that established a uniform system of classification, labeling, and packaging of hazardous substances. Directives 70/157/EEC regulating noise levels and exhaust systems, and 70/220/EEC limiting vehicular emissions soon followed. These directives were all parts of the Community's general harmonization program. The motor vehicle emission law illustrates particularly well the focus of Europe's environmental policy on the elimination of potential trade barriers. It was first issued by the EEC in reaction to legislative proposals in – West Germany and France – aimed at increasing protection from the potential health and environmental risks posed by automobile emissions. The proposed national regulations threatened the uniform European system of type approval of motor vehicles; therefore, the Community acted to preserve the existing system.[23] All of these early protectionist measures found their legal foundation in Articles 100 and 235 of the Treaty of Rome.

The historical significance of SEA, adopted in July of 1987, is that it "gave formal recognition to the Community environmental policy and provided for the first time a clear and unambiguous legal basis for EC environmental law."[24] The main features of the Act are set forth in Article 130, paragraphs R, S, and T. Action taken under Article 130 is subject to the principle of subsidiarity, that is, "The Community shall take action relating to the environment to the extent to which the objectives [of EC policy] can be attained better at the Community level than at the level of the individual Member States." [25]Article 130R defines the objectives of EC environmental policy as follows: 1) preserve, protect and improve the quality of the environment 2) contribute towards protecting human health 3) ensure a prudent and rational utilization of national resources.[26] Article 130R(2) establishes the principles on which Community action to achieve environmental objectives should be based, namely preventative action should be taken, and the polluter should pay. It also mandates that environmental protection requirements shall be included in future Community directives.[27] Factors the Community must take into account when preparing environmental policy proposals, as mandated by 130R(3), include available scientific and technological data, ecological conditions in various regions, potential costs and benefits of taking action or not doing so, and the economic and social development of the Community.[28] Article 130R(4) authorizes the EC to take action to implement Article 2 objectives of the Treaty of Rome that are best carried out at the Community level.[29]

Article 130S provides for the enactment of environmental legislation freeing it from the requirement that it should serve economic ends, but such legislation must be adopted by unanimous agreement of the Council of Ministers.[30] Article 130T is a general safeguard clause that says, "The protective measures adopted in common pursuant to Article 130S shall not prevent any Member State from maintaining or introducing more stringent protective measures compatible with this Treaty."[31] In addition, an alternative basis for environmental legislation is provided under Article 100A. The Article requires environmental considerations to be a component of all future legislative proposals pertaining to the Common Market, and authorizes the possibility of a qualified majority approval of environmental legislation by the Council of Ministers, which had previously required unanimity – under Article 235.[32]

In 1993, the Council of Ministers approved a Commission proposal to establish a European Environmental Agency (EEA).[33] Initially, the institution was conceived as the European equivalent of the United States' Environmental Protection Agency (EPA) with both a monitoring and enforcement role. However, the EEA in its approved form is an agency restricted primarily to research and monitoring, with no enforcement powers. The EEA will no doubt be of indirect assistance to the Commission by providing information, which will be of assistance to the latter in its role of assuring member state compliance. This does not, however, suggest that the Council of Ministers supports a radical enforcement role for the Commission as Environment Commissioner Carlo Ripa di Meana envisaged when he suggested that sanctions should be imposed on member states found to be in habitual violation of Community policy, by excluding them from environmental funding programs.[34]

Enforcement of Community Environmental Legislation

Community environmental legislation is usually implemented through directives, in which the terms are required to be incorporated into national laws before they are effective. The Treaty of Rome requires member states to transmit to the Commission – within a given period – a statement of national legislative, regulatory, or administrative measures that give formal effect (that is, recognition) to a directive.[35] For full implementation, the member state must also ensure that ends specified by the directive are achieved in practice.[36] It is important to note that under EU protocol, the Community cannot directly enforce environmental legislation on regulated firms or private interests.[37] Therefore, it is the exclusive responsibility and prerogative of national governments to enforce protectionist measures within their respective jurisdictions.[38]

Since the vast majority of Community environmental laws are in the form of directives (applied to member states) attention to date is largely with ensuring that national governments rather than private interests (individually owned corporations and industries) comply with their obligations under European law.[39] In an effort to secure national compliance to Community directives, Article 169 of the EEC Treaty provides an infringement procedure (initiated by Commissioners) to enforce obligations imposed upon member states to incorporate and implement the relevant mandate.[40] However, it is important to note that under Article 169 (of the Treaty of Rome) the European Court of Justice has no enforcement jurisdiction. It can only render a declaratory judgment or, in case of emergency, a declaratory interim injunction.[41] According to Eckard Rehbinder and Richard Stewart, "This discretion and restriction of standing [referring to the European Court of Justice] constitute a central weakness of the infringement action and make it more a political than a legal device for securing compliance with the Treaty."[42]

In addition to the shortcomings of the infringement process, neither Community nor national laws provide for citizen enforcement actions (boycotts and filing law suits) against polluting sources.[43] As a consequence of "[enforcement] deficiencies inherent . . . in the [European] Community," McGrory argues, "their respective publics are still exposed to the threat of harmful air . . . and the cause of clean air has not progressed as far as it could have."[44]

Effects of Community Air Pollution Policy on the Automotive and Petroleum Industries 1970-1999

The adoption of health protection air quality standards for smoke and sulfur dioxide, in urban atmospheres, represented a major step towards integrating pollution control within the EC. It also opened the door for further atmospheric control standards relating to nitrogen dioxide, carbon monoxide, and hydrocarbons. Once the legislative, administrative and monitoring machinery were established for air quality standards, it provided a mechanism for the European Union to apply more stringent environmental regulations on industrial polluters.[45]

The Directive of 1970, on air pollution by motor vehicles, is one of many issued within the framework of the type-approval procedure for motor vehicles established by Directive 70/156/EEC. Under the latter, member states are obliged to grant (upon application) an EEC type-approval for a particular motor vehicle model if the requirements of the various special directives – involving about seventy vehicle specifications – are fulfilled.[46] Automobiles meeting Community standards are issued an EEC certificate recognized in all member states – indicating that the vehicle has legally met the standards imposed by EC legislation on the environment.[47]

Under the Motor Vehicle Air Pollution Directive 70/220/EEC an EEC type-approval and certificate, as well as a national type-approval may not be refused when the requirements of the directive are met. Since 1979, compliance with EU emissions standards is a prerequisite for granting the certificate. Cars that have an EU type-approval or certificate may not be refused registration, or be prohibited from use within the respective jurisdictions of member states – a principle set forth by the framework Directive 70/156/EEC. Moreover, since 1980, Community states may refuse national type-approval, or prohibit use of the automobile within their jurisdictions, when the car does not comply with EU regulations. The Directive implements a form of congruence by setting minimum and maximum standards within the Community. Furthermore, due to the export orientation of the European car industry, EU certificates are sought; therefore, a total system of harmonization is set in place with respect to environmental requirements.[48]

Directive 70/220/EEC set petrol fueled emission standards (for carbon monoxide, hydrocarbons, and nitrogen oxides) and specified testing methods.[49] In addition, the Directive of 1972 (on emission from diesel vehicles) and the Directive of 1977 (on emissions from diesel tractors) both provided emission standards for diesel engines.[50]

These directives were considered to be of prime importance since "Diesel-engined [sic] vehicles emit about four times the mass of particulate matter per unit weight of fuel consumed as compared with petrol-engined [sic] vehicles using leaded fuel."[51] In the beginning, Community harmonization of automotive emission standards was designed to eliminate technical barriers to trade. It sought to apply the EEC type-approval system for gasoline, which was threatened by German and French initiatives to impose stricter emissions controls (on the petroleum and automobile industries) within their respective jurisdictions.

Lead in petrol became an EC issue, in 1971, when West Germany first proposed legislation severely restricting its use. At that time, German environmentalists and the developing Green Party were pushing for the introduction of unleaded gasoline as soon as possible. Increasing environmental damage to the Black Forest – attributed to atmospheric pollution (in the form of acid rain) alarmed the German populace, who believed that motor vehicle exhaust emissions were to blame. To reduce the threat, West Germany announced it would introduce catalytic converters on new model cars starting in 1989.[52] Since these do not work efficiently with leaded fuel, an early ban on lead in gasoline was needed. Denmark, Luxemburg, and the Netherlands joined West Germany in their willingness to require the introduction of unleaded petrol by 1986.[53] It is important to note that in Europe, unleaded petrol means a lead content of between 0.01 and 0.02 g/l.[54]

The need to reduce lead use in gasoline was exemplified in an EEC sponsored study (the Isotopic Lead Experiment) undertaken in and around Turin, Italy in the 1970s. In the vicinity of Turin, the lead added to all petrol distribution between 1975 and 1980 – being derived from the Broken Hill mine in Australia – had an isotopic ratio distinct from that used before and afterwards. This experiment enabled researchers to estimate both the pathways taken by petrol lead in the environment, and the total contribution of petrol lead to the body burden (that is, the amount of a substance that has already accumulated in the body). The percentage of isotopic lead intake averaged twenty-four percent in Turin adults, compared with eleven to twelve percent in adults living 25 km (15 miles) or more from the center of town. Estimates of the special lead intake in children reached thirty percent after 1979.[55]

In light of these developments, the EC quickly set in place measures to gradually reduce the lead content in gasoline – with the ultimate purpose to introduce unleaded fuel – within all member states. Consequently, the Directive of 1978 (on the lead content of gasoline) limits lead inputs through product standards rather than regulating lead outputs directly through an emission standard. From January of 1981 until 1989, the maximum permitted lead compound content of gasoline marketed in the Community was 0.4 g/l. Moreover, member states were obliged to ensure that the reduction of lead content did not cause a significant increase in other pollutants. Once again the directive employed a "straddle" strategy of harmonization, which established a maximum (0.4 g/l) and minimum (0.15 g/l) standard, leaving member states free to select a level of control within the limits specified.[56] The range method came about as a result of a compromise between environmentally aggressive nation states (West Germany, the Benelux, and Denmark) and those with pressing industrial concerns (France, Britain, and Italy). In fact, West Germany was annoyed by the first EC proposal (a fixed lead standard of 0.4 g/l) because the nation had previously introduced a standard of 0.15 g/l in 1976, and was not prepared to consent to any deterioration. On the other hand, a number of other member states had national lead standards well above 0.4 g/l and were unwilling "to impose on their refining industry the heavy economic burden" that West Germany had absorbed in previous years.[57]

In addition, France, Italy, and the United Kingdom (with their distressed car manufacturing industries) were opposed to further, or at least speedy, emission reductions. They argued that the health, environmental necessity and economic effects of these directives were not yet sufficiently clarified. From the German point of view, the economic and technological difficulties were manageable. In fact, they went on to argue that there were already technologies on the market whose utilization would enable European car manufacturers to comply with the new requirements. Furthermore, the Germans stressed that economic objections to stricter environmental standards were baseless considering it was a proven scientific fact that new generation, low emission engines were more efficient and consumed less energy.[58] Under mounting environmentalist pressures – within the affiliated states – the German perspective prevailed. Consequently, a final directive was agreed to, which allowed unleaded petrol to be introduced as early as 1986, but no later than 1989. Furthermore, the Commission proposed that US standards (similar to those of Germany) should be achieved in three steps between 1989 and 1993, and that each member state be allowed to impose these standards on its petroleum industries beginning in 1986.[59] Since 1993, leaded petrol for passenger transports are prohibited and catalytic converters are now the norm for all new vehicles.[60]

In 1997 and 1999 the EU issued directives to further tighten automobile emissions. In October of 1999, the European Parliament's Environmental Committee approved a plan to limit emissions from diesel fueled commercial transport vehicles. Moreover, Germany's Environment Minister Juergen Trittin urged the Union to adopt a requirement that diesel powered cars use "particulate matter traps," which German studies showed dramatically reduced the carcinogenic potential of diesel exhaust.[61]

Effect of Community Air Pollution Policy on Stationary Facilities – Chemical Plants and Power Stations 1976-2001

During the 1970s, the EC became convinced that there was sufficient medical evidence to justify proposing air quality standards for various pollutants. A number of incidents associated with industrial facilities (producing fuels, solvents, pesticides, herbicides, and plastics) prompted public recognition of the potential adverse health effects of toxic chemicals released into the atmosphere. One incident that gained widespread international attention occurred in Seveso, Italy – a manufacture site of the herbicide trichlorophenol (TCP). On July 10, 1976 an explosion at the Seveso chemical plant released toxins into the atmosphere, notably dioxin (2, 3, 7-8 tetrachlorodibenzoparodioxine) or TCDD – a known carcinogen when inhaled by humans.[62] A toxic cloud composed of dioxin, trichlorophenol, and ethylene glycol drifted downwind over a population center. Within a fortnight, animals and plants were dying and people were being admitted into emergency rooms with ulcerated skin lesions and emesis. No human mortalities were directly linked with the disaster, but because of a possible link between dioxin and genetic mutations – ninety women opted to abort their fetuses.[63] Moreover, seven hundred individuals (living within close proximity of the plant) were evacuated, and five thousand residents (in less contaminated areas) were prohibited from gardening, or raising livestock.[64]

The Seveso incident brought considerable changes to the chemical industry in the form of the Seveso Directive issued in 1984. It obliged companies that manufacture or use a wide range of dangerous chemicals (such as chlorine and ammonia) to identify the risks present in their factories, and to inform workers and local residents what those risks are. The directive also lists the amounts of chemicals that can be stored safely within 500 meters (1650 feet) of each other. It also provides threshold measurements of dangerous chemicals that can be safely stockpiled in a single facility.[65]

For the most part, the majority of member states favored uniform emission standards for stationary sources (due to their putative simplicity in implementation and enforcement, and their alleged fair treatment of polluters in terms of costs assessed and burden of control).[66] In the beginning, Community environmental policy regarding fixed sources focused on sulfur compounds and particulate matter pollution.[67]Over the years, this scope has expanded to include nitrogen compounds, carbon dioxide, methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and chlorofluorocarbons (CFCs). Eckard Rehbinder and Richard Stewart linked this explosion in environmental legislation by the EC, once again, to environmentally progressive member states – particularly West Germany. In response to extensive damage suffered to its large forests from air pollutants such as sulfur dioxide, nitrogen oxides and other airborne chemicals, Germany pushed for extensive Community directives targeting industrial polluters. Furthermore, Germany (within the confines of EU law) stiffened its own pollution control program by imposing new regulations on major fuel burning installations, especially power plants and industrial boilers.[68]

With respect to sulfur dioxide (SO2), the EC strategy first applied was to regulate inputs by limiting the sulfur content of fuels. Sulfur emissions from domestic heating and small commercial installations – fueled mainly with gas oil – was the chief problem that the EC addressed. Directives issued in 1976 and 1981 called for the gradual reduction of the sulfur content in gas oil, type A and type B. The low sulfur (0.3%) content, type A, oil may be used anywhere. Type B, higher sulfur content (0.5%), oil may be used in clean air areas and in heavily polluted areas where gas oil accounts for an insignificant portion of emissions.[69]

In July 1980, the EC issued Directive 80/779/EEC setting forth the maximum concentrations of smoke and sulfur dioxide permitted in urban areas. In recognition of the synergistic effect of these two pollutants on health, the protection standard for sulfur dioxide is dependent on the level of smoke present. That is, as the amount of smoke present increases (on a particular time scale) the amount of sulfur dioxide allowed decreases.[70] The Directive of 1980, establishing limit values for sulfur dioxide and suspended particulates, together with directives on vehicle emissions – are the most important EC regulations on air pollution. [71] It is the opinion of Rehbinder and Stewart that the directive, to some extent modeled on the Dutch system of air pollution control, establishes Community wide mandatory ambient air quality standards and stricter guide values for SO2 and suspended particulates.[72]

By definition the ambient air standard is the legal expression of the permissible amount of pollutants allowed in the atmosphere, expressed in terms of time (hourly, monthly, yearly) and permissible concentrations (parts per million, micrograms per cubic meter). Overall, they are a measure of community performance, as opposed to individual emissions.[73] Air quality standards (guide values) for sulfur dioxide and suspended particulates (smoke) as specified in the EC Directive 80/779/EEC according to the OECD Smoke Calibration Curve are as follows.

Reference period	**Sulfur dioxide**	**Smoke**
Year (arithmetic mean of daily means)	40 to 60 *u*g/m3	40 to 60 *u*g/m3
Day (daily mean value)	100 to 150 *u*g/m3	100 to 150 *u*g/m3

Moreover, the mandate required that member states take appropriate measures to ensure achievement of the standards by 1983 at the earliest and 1993 by the latest.[74] The European Community agreed upon this grace period when they realized that some areas could not be brought into compliance by the initial date of 1983.[75]

The concentration of lead in the air was also the subject of a directive, which required that member states ensure that the annual mean concentration of lead in the air does not exceed 2 *u*g/m3 by 1987, or by 1989 – in areas given an extension. This directive thus introduced another pollutant for which air quality standards apply; consequently, prompted the development of national monitoring networks to ensure compliance. In addition, a separate directive requires monitoring of blood lead levels in the population.[76]

The EC created mandatory air quality standards designed to protect human health, and guide values to serve as long-term precautions, as well as points of reference for the creation of zones of special protection. The directive called for the establishment of three types of zones in which air quality standards for sulfur dioxide and particulates may differ from the general standards. Subsequently, areas within the Community are divided into non-attainment zones, development ones, and special protection zones.[77] According to the mandate, in zones where a member state considers it necessary to limit a foreseeable increase in pollution due to urban or industrial development (developmental zones), it may fix values lower than the limit values of the directive. In zones for which a member state desires special environmental protection (special protection zones), it may set values lower than the fixed values of the directive. The EC mandate also requires member state to set up an adequate network of air pollution monitoring stations to supply information to ensure compliance with air quality standards.[78] Moreover, the directive obliges member states to inform the Commission of the values, deadlines, and the time tables established for these zones and of any measures taken for attainment of the air quality objectives set for particular zones. Finally, member states must inform the Commission about violations of the limit values, the concentrations recorded, reasons for the existence of non-attainment zones, and measures taken to correct infringements.[79]

Within the groundwork of the policy on environmental protection (laid down in successive Action Programs on the Environment), the EC adopted various pollution control measures. These refer to the establishment of air quality control standards, the limiting of the amount of sulfur in gas-oil, and the requirement that industrial plants over 50 MW (mega watts) including power stations, must receive prior Community authorization prior to commencing operations. The policy, agreed to in 1984 and effective in 1987, requires that EC authorities be satisfied that a new plant will not give rise to significant air pollution and that appropriate preventative measures including abatement technology be employed – provided that it does not give rise to excessive costs.[80]

The EC's strategy represented a radical change in the approach to pollution control adopted in the United Kingdom. Consequently, strong opposition was expressed to the proposed introduction of air quality standards. This was one reason for the proposed directive taking four years before being finally adopted. In the past, British strategy relied heavily on the willingness of industrialists to employ the best practical means to reduce pollution rather than to apply coercive penalties. This in turn, was interpreted by some as evidence of the British government sanctioning industrial "dirty" practices.[81] In examining the British approach, other member states had serious doubts as to whether a system based on voluntary compliance would be adequate in advancing pollution control measures. Therefore, environmentally conscious nation states (West Germany, Luxembourg, Netherlands, Belgium, and Denmark) stood firm on their demand to have a clearly defined and mandatory air quality standard.[82]

During the 1990s, UK public sentiment regarding Community directives (on air pollution) improved – since they were credited with introducing the concept of air quality standards to Britain. Moreover, John McCormick states, "some of the confusion in the division of domestic responsibilities between local, regional, and national authorities in Britain has been bypassed by the transference of certain powers to the Community level."[83]

Environmental measures taken by the UK (just prior to entering the European Community – in 1973), illustrates a change in attitude regarding pollution control within its borders. By the early 1970s, ground level concentrations of suspended particulates decreased markedly, but in some cities such as London and Sheffield – sulfur dioxide levels remained at a relatively high level. During pollution episodes in London in December 1972 and 1975, peak sulfur dioxide levels significantly exceeded smoke concentrations. Fuel oil was believed to be the major source of the high sulfur dioxide concentrations. Limiting the sulfur content of fuel oil appeared to be the appropriate way to tackle this pollution problem. The existing Greater London Council set a precedent for this type of pollution control policy, stemming from legislation introduced in 1972, requiring all new oil fired installations in London to use fuel oil with a maximum of 1 percent sulfur content. Furthermore, all existing installations had to comply with this limit by 1987. Under section 76 of the Control of Pollution Act of 1974 all local authorities were permitted to follow the example of the Greater London Council.[84] "To some extent, this provision was introduced in anticipation of a need for it in order to fulfill a European Community (EC) directive notified in 1975."[85]

In the late 1970s and early 1980s, economists identified coal as an important growth aspect for the British economy. In response, the EC renewed a series of anti-pollution measures, which designated the establishment of smoke control areas. By 1984, almost two-thirds of urban properties were covered by smoke ordinances.[86]

In the analysis of the effect of Europe's environmental legislation on Britain, Derek Elsom concludes that the evidence seems to indicate that membership in the EC has "been a helpful stimulus for environmental protection in Britain."[87] Moreover, "Air quality in the United Kingdom has, or will have, improved as a consequence of EC Directives."[88] Finally, he argues "The EC seems to have injected a greater sense of urgency into improving air quality, than was apparent in Britain during the 1970s and 1980s"[89]

To gain a full understanding of the repercussions of the Community's environmental strategy, one must examine specific directives aimed at suppressing industrial pollution. In fact during the 1970s and 1980s, the Commission submitted numerous proposals designed to significantly reduce pollution emissions from large combustion plants. One of them, which eventually become law, limited the total emissions from power stations over 50 MW in each member state requiring, by 1995, an emission reduction of sixty percent in sulfur dioxide, forty percent in nitrogen oxides, and forty percent in smoke. The legislation also required emissions from new plants, or those that have undergone substantial alteration, to comply with stringent emission limits by 1985, and all others by 1995. Plants with outputs of 100 MW must comply by 1990. Finally, power stations greater than 300 MW must use low sulfur fuel (that is, coal or oil with less than one percent sulfur).[90]

In 1980, total UK sulfur dioxide emissions amounted to about 4.7 million tons, of which 3.6 million tons were from about 450 plants greater than 50 MW, and 2.9 million tons from coal-fired power stations. At the time, it was estimated that the proposed EC directive would reduce sulfur dioxide emissions by 2.2 million tons, or forty-seven percent. Given the dominance of emissions from power plants, this reduction could be achieved by considering only the major Central Electricity Generating Board (CEGB) coal-fired power stations, with fourteen being over 1000 MW. To meet the deadline for the EC directive (that is to achieve a sixty percent reduction of sulfur dioxide emissions below 1980 levels by 1995) would require that twelve CEGB power stations be retrofitted with Flue Gas Desulfurization (FGD) systems.[91]

The overall capital cost of retrofitting FGD systems to the CEGB coal-fired power stations was estimated to be *L*1432 million over a ten year period at 1983 prices, although if the output capacity lost through the use of the FGD system were to be replaced, the total would reach *L*1990 million.[92]However, the financial impact of FGD would not occur at one time. An investment program to introduce FGD at existing power stations would result in capital and operating expenditures of up to *L*450 million per year. For the consumer the whole program would add six percent or less to electricity prices.[93] The significance of this proposed legislation is that it illustrates the potential rise in energy costs, resulting from progressive EC environmental measures.

Since retrofitting FGD systems on power plants appeared to be inevitable, Great Britain – caving to intense political pressure by the EC – announced in 1986 that it would employ FGD systems in three of its largest energy stations. This action was phased in over the period 1989-97 at a cost of *L*600-780 million, with an electricity price increase of one to two percent.[94]

EC directives on "carbon monoxide and unburnt [sic] hydrocarbons were introduced in 1970 and limits for oxides of nitrogen were added in 1977."[95] Since then, limits for all three pollutants have become stricter with successive EC directives. For example, the approach used in the SO2 directive was extended by Commission proposal 99a (submitted in 1983), which introduced limit values and guidelines for NO3 concentrations in the Community. It also required member states to formulate air quality improvement plans – heavily polluted areas – to meet these standards.[96] This legislation was championed by West Germany, which observed an eighty-five percent increase in nitrogen oxide emissions (during the previous decade) reaching an estimated three million tons, of which motor vehicles contributed about forty percent.[97] To reduce such emissions, the EC directive called for a marked reduction in nitrogen oxide, carbon monoxide and hydrocarbon emissions by 1995. In order to comply, the directive required larger cars to be fitted with catalytic converters and smaller cars to be equipped with lean burning engines.[98] On account of its faltering automotive industry, Great Britain vigorously opposed this legislation – but it was to no avail.[99]

The increasing domestic and industrial use of a number of stable chlorine containing compounds gave rise to claims that these substances may diffuse upwards into the stratosphere where they are dissociated by solar radiation to yield atoms of chloride, which act to destroy ozone through a complex chain of chemical reactions. Of these compounds, special attention was given to chlorofluorocarbons (CFCs), especially CFCL3 (Freon 11) used mainly as a propellant in aerosol sprays, and CF2CL2 (Freon 12) used extensively as a cooling agent in refrigerators and air conditioners.[100] The EC (who is responsible for thirty-four percent of world sales of CFCs) issued a directive in 1980, which placed a ceiling on total Community production of CFCs and required a 30 percent reduction in the use of CFCs in aerosol cans – by the end of 1981. Member states were also required to develop the best practicable technologies in order to limit emissions in the refrigeration, solvent and foam plastic sectors.[101] By 1983, as a result of action taken by the EC, there was a 21 percent reduction in world production of CFCs F-11 and F-12 from the peak level of 1974.[102]

In 1985, the European Community issued its Environmental Assessment Directive, which required assessment procedures to be carried out in respect of proposals for projects falling within classes specified in the directive. For those falling within Annex I, assessment is mandatory. For those falling within the much larger list in Annex II, assessment is required only where such projects may give rise to significant environmental effects. In addition, member states are given discretion to determine which particular projects falling within Annex II should be subject to assessment.[103] This directive caused a considerable amount of controversy, because some member states interpreted it as giving them unfettered discretion to exclude whole classes of industrial projects from environmental assessment.[104]

As mentioned earlier, 1990 witnessed the establishment of the EEA. Although the institution is restricted primarily to research and monitoring, it will no doubt be of indirect assistance to the Commission – by providing information to assist the latter in its role of initiating legislation and ensuring the implementation of EU directives.[105]

In 1997, the United Nations Convention on Global Warming, in a new effort to further reduce the emission of greenhouse gases, drew up the Kyoto Treaty. On July 23, 2001 one hundred and seventh-eight countries (including those of the EU) officially adopted the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The Kyoto memorandum – adopted into the EU's policy on atmospheric pollution – requires industrialized nations to reduce emissions of six gases believed to be exacerbating global warming, which includes carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), and sulfur hexafluoride (SF6).[106]

The agreement specifically addresses five key issues related to the implementation of the Kyoto Treaty and the reduction of greenhouse gases. The plan calls for the funding of poor countries to develop new technologies. Article 11 directs nations to "Provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in advancing the implementation of existing commitments" and "provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of advancing the implementation of existing commitments."[107]

The procedure also mandates that tough systems in each country be established to verify and report greenhouse gas emissions. Article 8 states,

> [E]ach Party . . . shall be reviewed by expert review teams . . . in accordance with guidelines adopted for this purpose . . . each Party . . . shall be reviewed as part of the annual compilation and accounting of emissions inventories and assigned amounts. The review process shall provide a thorough and comprehensive technical assessment. The expert review teams shall prepare a report . . . assessing the implementation of the commitments of the Party and identifying any potential problems in, and factors influencing, the fulfillment of commitments.[108]

The ordinance also permits heavily forested countries to use their "tree sinks" to offset their assigned amount of permissible greenhouse pollutants. Article 3 says, "greenhouse gas emissions by sources and removals by sinks in the agricultural soils and in the land-use change and forestry categories shall be added to, or subtracted from, the assigned amounts for Parties."[109] Furthermore, Article 18 of the Kyoto Protocol stipulates that countries failing to keep to their greenhouse gas reduction targets shall face legally binding consequences.[110]

Finally, the statute promotes the development of new technologies designed to lower atmospheric pollution. Article 10 of the concordat code calls for the formulation of "cost-effective national and . . . regional programmes [sic] to improve the quality of local emission factors . . . Such programmes [sic] would . . . concern the energy, transport and industry." Moreover, it demands that nations "Cooperate in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies."[111]

Development and Consequences of Environmental Technologies to Combat Air Pollution

According to Elsom, "There are commercial advantages in pursuing high environmental standards, as this will help to sustain an internationally competitive pollution control equipment industry."[112] Therefore, a country that can maintain a position in the forefront of pollution control will have considerable opportunities to export environmentally friendly technology provided other nations follow suit with similar abatement measures.[113] For example, the EU's directives on automobile emissions gave Japan and the United States a clear commercial advantage since their vehicles were already fitted with pollution control devices (catalytic converters) for the home market.[114]

In regard to stationary industrial facilities (chemical plants and power stations), the Kyoto Protocol and various Community directives present both restrictions and opportunities. The mandate to reduce greenhouse gases by five percent (Kyoto Treaty) will mean increased regulations and intensive monitoring of industrial practices. However, the development and production of anti-pollution technologies will provide a financial windfall for environmentally oriented industries. In fact, several technologies have been developed for reducing emissions of sulfur dioxide generated during the combustion process. Flue Gas Desulfurization (FGD) systems – known as scrubbers – vary according to the type of material used for sulfur dioxide absorption, the nature of the by-products, and the ability of the process to remove other pollutants, in particular nitrogen oxides. The most common technology presently in use is the wet scrubbing process based on spraying lime or limestone into the flue gas. The principle advantage of lime over limestone is the high sulfur dioxide removal efficiencies. The lime system is designed to achieve up to ninety percent reduction, but a reduction of ninety-nine percent is not uncommon.[115]

German Reunification and Environmental Protectionism

Following the reunification of the country in 1990, the primary task of German energy and environmental policy was to successfully merge the differing systems of East and West Germany – while maintaining compliance with EU directives. West Germany had a diversified and mainly privately owned system of energy supply, with a progressive standard of energy efficiency and a sincere commitment to environmental protection. In contrast, East Germany's energy sector was predominately centralized, state owned and dependent on relatively "dirty" lignite (brown coal) as its primary fuel.[116] Cleaning up the environment of former East Germany – by closing lignite mines – was one of the major objectives, in the energy and environmental policy, of the newly unified German nation.[117]

According to a report issued by the Energy Information Administration, the five Laender (states) that made up East Germany exhibited dramatic economic growth with a concurrent decrease in carbon emissions – during the 1990s. This turn of events is attributed to the closure of lignite mines, the implementation of air pollution abatement equipment, and the utilization of environmental technologies (such as solar and wind powered generators).[118]

The German government, elected in September 1998, was headed by the liberal leaning Social Democrat Chancellor Gerhard Schroeder, whose party ruled in coalition with the environmentalist Green Party. Consequently, Green Party member Juergen Trittin headed the Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety.[119] The German government's energy and environmental policy objectives included reducing energy related emissions, phasing out nuclear power, and increasing German's reliance on renewable energy. Furthermore, the government initiated a regime of "eco-taxes" to encourage more environmentally friendly energy use.[120]

When it comes to the prevention and control of pollution from stationary facilities, Germany is currently the European leader in technical implementation of abatement techniques such as Fluidized Bed Combustion systems and FGD. Germany's ranking resulted from the nation's strict pollution control policy, which induced innovations in production processes. Furthermore, industries (in member states lagging behind in environmental protection) are actively seeking the expertise of German personnel to help them implement pollution control systems.[121]

Conclusion

The EU's policy on atmospheric pollution greatly impacted the industrial sector. Besides improving air quality within the EU, Community directives and international treaties on the environment resulted in increased regulations, intensive monitoring, rising production costs and changes in industrial practices. In addition, the policy is instrumental in the development of new industrial technologies designed to protect the environment, which has the potential to create employment opportunities and more wealth.

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[2] Ibid., 180.
[3] Eckard Rehbinder and Richard Stewart, Environmental Protection Policy. (New York: Walter de Gruyter, 1988), 15.
[4] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," European Law Review 15, no. 4 (1990): 303.
[5] Ibid., 304.
[6] Eckard Rehbinder and Richard Stewart, *Environmental Protection Policy*. (New York:
[7] Derek Elsom, *Atmospheric Pollution*. (New York,: Basil Blackwell, 1987), 210, 211.
[8] Barbara Adam and Maarten Mentzel, "Editorial: the Environment in Question: From Crisis to the Maintenance of Things," *Innovation: The European Journal of Social Sciences* 9, no. 4 (December 1996): 403, 404.
[9] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," *European Law Review* 15, no. 4 (1990): 304.
[10] Eckard Rehbinder and Richard Stewart, *Environmental Protection Policy.* (New York: Walter de Gruyter, 1988), 17.
[11] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991):135.
[12] John McCormick, *Reclaiming Paradise: The Global Environmental Movement*. (Indianapolis: Indiana University Press, 1989), 97-105.
[13] Ibid., 181.
[14] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 135, 136.
[15] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," *European Law Review* 15, no. 4 (1990): 304.
[16] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 136.
[17] John McCormick, *Reclaiming Paradise: The Global Environmental Movement*. (Indianapolis: Indiana University Press, 1989), 181.

[18] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," *European Law Review* 15, no. 4(1990): 305.
[19] Eckard Rehbinder and Richard Stewart, *Environmental Protection Policy*. (New York: Walter de Gruyter, 1988), 16.
[20] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 136.
[21] Ibid.
[22] Eckard Rehbinder and Richard Stewart, *Environmental Protection Policy*. (New York: Walter de Gruyter, 1988), 20, 21.
[23] Ibid., 16, 17.
[24] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 137.
[25] Ibid.
[26] Ibid.
[27] Ibid.
[28] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," *European Law Review* 15, no. 4(1990): 306.
[29] Ibid., 305.
[30] Ibid.
[31] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 137.
[32] Ibid., 137, 138.
[33] John McCormick, *Understanding the European Union: A Concise Introduction.* (New York: Palgrave, 1999), 114.
[34] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 140, 141.
[35] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," *European Law Review* 15, no. 4(1990): 307.
[36] Ibid., 308.
[37] Eckard Rehbinder and Richard Stewart, *Environmental Protection Policy*. (New York: Walter de Gruyter, 1988), 145.
[38] Ibid.
[39] Richard Macrory, "The Enforcement of Community Environmental Laws: Some Critical Issues," *Common Market Law Review* 29, no. 1 (1992): 348.
[40] Eckard Rehbinder and Richard Stewart, *Environmental Protection Policy*. (New York: Walter de Gruyter, 1988), 37.
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[42] Ibid.
[43] Ibid., 164.
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[45] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 213, 214.
[46] Eckard Rehbinder and Richard Stewart, *Environmental Protection Policy*. (New York: Walter de Gruyter, 1988), 75.
[47] Ibid.
[48] Ibid., 77.
[49] Ibid., 75.
[50] Ibid., 77, 78.
[51] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 215.
[52] Ibid., 216, 217.
[53] Ibid.
[54] Ibid., 216.
[55] Ibid., 56.
[56] Eckard Rehbinder and Richard Stewart, Environmental Protection Policy. (New York: Walter de Gruyter, 1988), 78.
[57] Ibid.
[58] Ibid., 76.
[59] Ibid.
[60] "Germany: Environmental Issues," *Energy Information Administration* http://www.eia.doe.gov/cabs/germe.html
[61] Ibid.

[62] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 58.
[63] Ibid.
[64] Ibid.
[65] Ibid., 59.
[66] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," European Law Review 15, no. 4(1990): 306.
[67]Eckard Rehbinder and Richard Stewart, Environmental Protection Policy. (New York: Walter de Gruyter, 1988), 80.
[68] Ibid., 84.
[69] Ibid., 80.
[70] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 211.
[71] Eckard Rehbinder and Richard Stewart, Environmental Protection Policy. (New York: Walter de Gruyter, 1988), 81.
[72] Ibid.
[73] Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," European Law Review 15, no. 4(1990): 300.
[74] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 214.
[75]Daniel P. McGrory, "Air Pollution Legislation in the United States and the Community," European Law Review 15, no. 4(1990): 306.
[76] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 217.
[77] Eckard Rehbinder and Richard Stewart, Environmental Protection Policy. (New York: Walter de Gruyter, 1988), 81, 82.
[78] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 213.
[79] Eckard Rehbinder and Richard Stewart, Environmental Protection Policy. (New York: Walter de Gruyter, 1988), 82.
[80] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 265, 266.
[81]David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 139.
[82] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 211, 212.
[83] John McCormick, *Reclaiming Paradise: The Global Environmental Movement*. (Indianapolis: Indiana University Press, 1989), 181.
[84] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 206.
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[86] Ibid., 201.
[87] Ibid., 218.
[88] Ibid.
[89] Ibid.
[90] Ibid., 266.
[91] Ibid.
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[93] Ibid.
[94] Ibid.
[95] Ibid., 215.
[96] Eckard Rehbinder and Richard Stewart, Environmental Protection Policy. (New York: Walter de Gruyter, 1988), 84.
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[98] Ibid.
[99] David Freestone, "European Community Environmental Policy and Law," *Journal of Law and Society* 18, no. 1 (1991): 139.
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[102] Ibid., 275.
[103] Richard Macrory, "The Enforcement of Community Environmental Laws: Some Critical Issues," *Common Market Law Review* 29, no. 1 (1992): 359, 360.
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[108] Ibid.
[109] Ibid.
[110] Ibid.
[111] Ibid.
[112] Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 218.
[113] Ibid.
[114] Ibid.
[115] Ibid., 256.
[116] "Germany Environmental Issues," *Energy Information Administration*, accessed October 15, 2001, http://www.eia.doe.gov/cabs/germe.html.
[117] Ibid.
[118] Ibid.
[119] Ibid.
[120] Ibid.
[121]Derek Elsom, *Atmospheric Pollution*. (New York: Basil Blackwell, 1987), 269.