The present governmental approach toward solving the pollution crisis is inadequate for several reasons. The costs of eliminating pollution entirely are astronomical, and many of these costs must be borne by private industry. In this Perspective, the author maintains that some degree of cooperation among industrial competitors is essential to keep the cost to a manageable level and to prevent duplication of efforts. The existing governmental policy of using antitrust law to inhibit cooperation in antipollution research and development is detrimental to the public interest and therefore must be re-evaluated in light of the realistic possibilities of pollution elimination.

The present governmental approach to pollution control has not produced results satisfactory to environmentalists. The sheer magnitude of the problem now requires that government consult with industry and that various businesses join together to solve problems recognized as requiring a common effort. Although the necessity of such cooperation has been stressed at different times by various officials of the Federal Government, antitrust enforcement agencies have been

1. See text accompanying notes 4-23 infra.
2. The Congressional Record is replete with statements by Senators calling for cooperation. For example, Senator Muskie has said: "As each day passes there is a greater urgency for closer cooperation between Government and industry . . ." 113 CONG. REC. 9854 (daily ed. July 18, 1967). The necessity of cooperation on the part of all segments of our national economy was clearly one of the purposes behind the Air Quality Act of 1967. Martin & Symington, A Guide to the Air Quality Act of 1967, 33 LAW & CONTEMP. PROB. 239, 242-43 (1968). In an article submitted to the Subcommittee on Air and Water Pollution of the Senate Committee on Public Works, Richard Moore of M.I.T. stated:

   In today's changing technological society, a large corporation must also understand the process of innovation and join hands with the industry-government-university team in order to seek solutions to the many problems with which we are faced, even though these may fall outside the company's field of endeavor.

   During the war, technically oriented businesses such as General Electric, du Pont, Monsanto, Union Carbide, and Western Electric, all became engaged in research, development and management of massive complex programs relating to the production of nuclear weapons.

Hearings Before the Subcomm. on Air and Water Pollution of the Senate Comm. on Public Works, 90th Cong., 2d Sess. 225, 228 (1968) [hereinafter cited as Hearings].

   In a related area, that of vehicle safety, the Senate Commerce Committee stated:

   Although the Committee firmly believes that competition among automobile manufacturers in the development of safety improvements is essential for the achievement of rapid progress in automobile safety, the Committee is aware that cooperation in research and testing among manufacturers can
deeply suspicious\textsuperscript{3} of any cooperative efforts by competitors because such efforts may involve agreements or actions that under normal circumstances,\textsuperscript{4} would constitute violations of the antitrust laws.

This Article discusses the cooperative antipollution efforts of the automobile industry, analyzing the legality of such cooperative action under the existing antitrust laws. It also explores the constructive possibilities offered by such cooperative action. The major portion of this Article, then, is devoted to the question of cooperative efforts in research and development of means to abate and control pollution. Part I examines the factors that seem to give rise to the necessity for a cooperative effort on the part of industry. Part II reviews antitrust policy as it has been applied in the past to cooperative commercial ventures in research and development, that is, cooperative efforts with a primary emphasis on economic gain or benefit rather than social benefits or gains. Part II then discusses the trade association as a vehicle for cooperative efforts, and considers the effect of antitrust policy on cooperative ventures to solve problems affecting health and welfare. Finally, the author offers recommendations for conducting cooperative research in the general area of health and safety.

also play a significant role in safety development.


3. For example, the Department of Health, Education & Welfare pursuant to a government sponsored program under the Air Quality Act of 1967, sought the approval of the Antitrust Division of the Justice Department for cooperative action on the part of members of the leading aluminum companies to try and solve air pollution problems. Necessary to such cooperation was the exchange of technical information of a confidential type. The Justice Department stated that the exchange of such information among competitors, even though the parties were participating in a government sponsored program, would subject the parties to antitrust liability.

Letter from Mr. Walker B. Comegys, Deputy Assistant Attorney General, Antitrust Division to Mr. Manuel B. Hiller, Assistant General Counsel, Div. of Business & Administrative Law, Dep't of H.E.W., April 1, 1970.

The Senate Committee on Commerce commented at some length on research areas which it believed needed special attention. In addition to the special emphasis on fuel research, the committee suggested certain areas where additional federal assistance to industry in developing improved control equipment could be effective—such as joint efforts with control equipment manufacturers to study common problems, and joint support and direction of research and development with trade associations concerning unsolved pollution problems. S. Rep. No. 403, 90th Cong., 1st Sess. 18-19 (1967).

4. "Normal circumstances" as used here means that producers have adequate incentives due to normal market forces (supply and demand) to competitively produce items in advance of full-blown competition. The author believes that the characteristics of business are such that at the moment no individual manufacturer has adequate incentive to develop or purchase pollution control technology in advance of competition or coercive government regulation. When air and water pollutants are made truly commercial—that is, when each has a cash-redemption value—then the nation's waters and air should be cleaned up more quickly.
I

THE NEED FOR COOPERATION

The limited goals of present legislation and the potential costs to government and industry of effective programs have prevented the United States from making significant progress in pollution abatement. The attack on the national pollution problem should properly be spearheaded by the Federal Government. Yet, federal antipollution laws have been less than successful: an indication of the inadequacy of their approach lies in the history of the Federal Water Quality Act of 1965 and the Clean Water Restoration Act of 1966. \(^5\) Some seven years after these Acts, most of the lakes and rivers that were dirty at the Acts' passage are not discernibly cleaner. If Lake Erie is already "a dying lake," Lake Michigan is coming to share its fate, sick with what Senator Gaylord Nelson has called the "dull, gray tide of pollution [which] is moving through our Great Lakes, following the path of human progress." \(^6\) The cities that border San Francisco Bay dump so much trash into the Bay that conservationists fear the famous body of water will one day cease to exist. \(^7\)

Some of the reasons for the failure of present programs are found in the laws themselves. An example is the Federal Water Pollution Control Act, which permits delays in legal enforcement for up to two years. \(^8\) Court proceedings are provided for, but often the standards, and not the violators, are what are on trial. \(^9\) Amendments and lobbying have emasculated some acts. In one instance—the area of auto air pollution—the automobile lobby was able to insert a section in the Federal Air Quality Act of 1967 which prohibited the states, except California, from regulating emissions from new vehicles. The Clean Air Act of 1970, however, corrected this deficiency. \(^10\) Some commentators have described most of the legislation in the area of air and water pollution as being totally misdirected in approach, utterly missing the urgency of the problems confronting us today. \(^11\)

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9. R. & L. Rienow, supra note 6, at 136.
A. The Problem of Government Costs

A major barrier to effective governmental pollution control programs has been their great cost and the unwillingness or inability of the government to fund them adequately. A recent survey by the Federal Water Control Administration indicates that for the five year period beginning in 1968, total necessary capital costs for municipal waste treatment facilities alone can be expected to total $14.2 billion, while needed operation costs will be $1.4 billion; for industrial treatment during the same period, capital expenditure requirements are estimated at $2.6 to $4.5 billion and operating costs at $3.0 to $3.6 billion. An outlay of $31.6 billion over the next five years is estimated as the amount required to abate the air and water pollution presently emitted by manufacturing industry. A report by the General Accounting Office indicates that "an expenditure of $5.4 billion to reduce water pollution in the past twelve years has left the nation's rivers as foul as they were before any of that money had been spent." Furthermore, experts estimate that it will cost between $24 and $26 billion over the next five years to do an acceptable job of cleaning our streams, lakes, rivers and bays. A federal study recently recommended that cities and private companies spend about $1.4 billion immediately to prevent further contamination of Lake Erie, on which eleven million people depend for drinking water. Finally, significant sums will be needed to continue already existing pollution programs. The Environmental Protection Agency has estimated that total investment for control of air pollutants from stationary sources in 298 major metropolitan areas will total approximately $6.3 billion for the ten year period of 1967-1976. Yet most of that amount, over $5 billion, would be
required from 1970-1975 to meet the standards set by the 1970 Clean Air Amendments.\textsuperscript{18}

Municipal and state attempts to curb pollution have led to the growth of regulatory agencies which apparently have recognized the problems but have not developed plans to solve them.\textsuperscript{19} Regional water pollution boards, air pollution control districts, and air standards boards have been established mainly on the promise of federal assistance to help cities and states finance pollution abatement.\textsuperscript{20} Despite these plans for large contributions, the federal government has not provided significant funding to municipal and state facilities.\textsuperscript{21} Federal appropriations for pollution control have almost consistently fallen short of authorized amounts, and municipalities have often been unable to raise matching funds that in some instances are a condition for receiving federal money.\textsuperscript{22} Without proper funding, smaller government agencies are virtually impotent to fight pollution, particularly in the area of research and development; they cannot easily recruit the highly specialized scientists, physicians, chemists, engineers, and meteorologists required in such an ecological emergency.\textsuperscript{23}

**B. Private Sector Costs and Cooperation**

Nearly every large manufacturing industry is a significant contributor to the pollution problem in one form or another and therefore is the object of environmentalists' protests.\textsuperscript{24} Pressure for control of pollution is often focused on single companies; more commonly it is directed at industry in the abstract or to individual industries. For the most part industry has responded with individual efforts, such as the major aluminum companies' can reclamation programs and individual research programs such as Firestone Rubber Company's plan to boil down old tires for the chemical gas and tar in the casings. These pro-

\begin{itemize}
\item \textsuperscript{18} \textit{COUNCIL ON ENVIRONMENTAL QUALITY, ANNUAL REPORT} 150 (1971).
\item \textsuperscript{19} One commentator believes that such agencies are based on a fallacious assumption and asks whether this welter of proposals [for councils, agencies, advisory commissions, and billion-dollar programs] squarely attacks the real problem [because they are all based] on the fact that all of our institutions are rooted in the notions of inexhaustible supply and limitless ability to repair. [The] answer can be found only by examining specific conflicts between technology and environment and analyzing the way our institutions attempt to resolve them. Ottinger, \textit{supra} note 11, at 666-67.
\item \textsuperscript{20} See 33 U.S.C. §§ 1155(c), (e) (1970).
\item \textsuperscript{21} See Reitze, \textit{supra} note 11, at 923.
\item \textsuperscript{22} Merjos, \textit{supra} note 15, at 1.
\item \textsuperscript{23} See Ludwig, \textit{Air Pollution Control Technology: Research And Development On New And Improved Systems}, 33 LAW & CONTEMP. PROB. 217 (1968).
\item \textsuperscript{24} Reitze, \textit{supra} note 11, at 923.
\end{itemize}
grams, while commendable, are token measures when one looks at the magnitude of the problem.\textsuperscript{25}

The private sector is hampered in pollution abatement, like the government, by the astronomical cost.\textsuperscript{26} Although individual companies are beginning to accept pollution control expenditures as a cost of doing business, a major problem is that pollution abatement facilities can be very expensive and unproductive in the commercial sense, profoundly affecting profits. Some companies have chosen to close facilities rather than install expensive pollution-control equipment.\textsuperscript{27}

The cost of controlling industrial wastes can represent a substantial portion of total capital investment. Many businesses, particularly those which are small or inefficient, do not have access to such capital. It is difficult to make pollution abatement financially attractive to such businesses. Even if a profitable by-product could be obtained through pollution control, the economic return is rarely equal to the return which could be obtained from utilizing the necessary capital in more traditional investments.\textsuperscript{28}

\textbf{C. Advantages of Cooperative Research}

The extremely high cost of pollution abatement, the ineffectiveness of current federal and state pollution control approaches and the likelihood that we are running out of time to reverse the harm already done to the environment,\textsuperscript{29} lead to the conclusion that it is an unjustifiable waste of time and resources for individual companies or government agencies to duplicate efforts,\textsuperscript{30} when the combined research facilities and funds of an entire industry, might produce more substantial results in a much shorter time.\textsuperscript{31} Cooperation would also permit indus-

\textsuperscript{25} In fairness, industrial expenditures for pollution abatement plants and equipment have risen at a rate of 30 to 35 percent a year. According to one estimate, industries spent more than $1.0 billion for pollution control in 1968, and a McGraw-Hill survey of plans for 1969 indicated that such spending would increase by 40 percent to nearly $1.5 billion. Merjos, \textit{supra} note 15, at 4.

\textsuperscript{26} A governmental study entitled "The Economic Impact of Pollution Control" estimates that the total air and water pollution control costs for the manufacturing industry, not including mining and agricultural pollution, will be $31 billion for the period from 1972 to 1976. \textit{N.Y. Times}, Mar. 13, 1972, at 1, col. 3.

\textsuperscript{27} The Portland Cement Company recently announced that it will close a plant that produces one-third of the company's output rather than spend about $1 million to install equipment that would bring the facility into compliance with Pennsylvania's air pollution control laws. Merjos, \textit{supra} note 15, at 4. However, a governmental study has noted that most closings will be restricted to small, old, and inefficient plants. \textit{N.Y. Times}, Mar. 13, 1972, at 1, col. 3.

\textsuperscript{28} For a detailed examination of industrial pollution abatement costs, see \textit{Federal Water Pollution Control Admin.}, \textit{supra} note 13, at 1.

\textsuperscript{29} See text accompanying notes 31 & 32 \textit{infra}.

\textsuperscript{30} See \textit{Reitze, supra} note 11, at 926.

\textsuperscript{31} In the area of joint industrial-municipal cooperation, a $35 million facility to
tries to direct their energies toward voluntary resolution of these problems rather than continuing their resistance to legislation and regulatory agencies. It is perhaps the fear of antitrust action that deters industries from taking joint action in seeking solutions to many of the pollution problems that exist today.

Cooperative efforts on the part of industry are not unknown in this country, especially during periods of national emergency or periods of national defense needs. During such times, the government has taken steps to provide for cooperative efforts to solve problems that could not readily be solved by legislation and funding alone. In the past, laws have been enacted to suspend in part the enforcement of federal antitrust laws and the Federal Trade Commission Act when the prohibited activities would benefit national defense or security. During these critical periods, the government recognized a need for something other than a strict competitive model. When this type of legislation has been enacted, the scope of the suspension has been limited and procedural safeguards established. Exemptions have been provided not only during periods when cooperation was necessary to national defense, such as during World War II, but during periods of economic emergency, such as the period immediately following the Second World War, when cooperative action on the part of particular industries was sought to combat inflation.

The urgency of the present situation seems to dictate a similar massive effort on the part of government and industry to control pollution. While some manufacturers have indicated a willingness to cooperate with other members of their industries to fight pollution, they have also indicated a fear of antitrust liability for such efforts. The dispose of pulping liquors and bleaching filtrates is being constructed at Hammermill Paper's pulping mill in Erie, Pennsylvania. The City of Erie will bear a part of the cost of the project which will also serve as a joint City of Erie-Hammermill sewage-treatment plant. Merjos, supra note 15, at 4. Government likewise can participate in such cooperative efforts. Some legislation already provides a framework within which an active government-industry partnership could work toward this goal, see, e.g., the Clean Air Act of 1970, discussed at note 10 supra.

32. 56 Stat. 23 (1942).
33. Id.
34. Id. Following World War II, Congress enacted the Anti-Inflation Act to aid in stabilizing the economy of the United States, to aid in curbing inflationary tendencies, to promote the orderly and equitable distribution of goods and facilities, and to aid in preventing maldistribution of goods and facilities which basically affect the cost of living or industrial production. The law provided that any act or omission by any person in compliance with a request made pursuant to the law should not be the basis for any prosecution or any civil action or proceeding under the antitrust laws or the Federal Trade Commission Act. See Anti-Inflation Act, 63 Stat. 5 (1948).
35. It has been claimed that the fear of antitrust sanction has prevented cooperation among members of industry in programs relating to health and safety. This
real or imagined threat of antitrust action has thus retarded the efforts of some segments of industry which may honestly wish to solve pollution problems.

A total suspension of the antitrust laws is not necessary and not likely. Moreover there is authority for the contention that cooperative research may be conducted under the present interpretation of the antitrust laws. The "rule of reason," for example, might be particularly applicable to activities that are clearly in the best interest of public health and safety. Government antitrust officials, in statements and speeches, have already offered preliminary guidelines for such research.36 Since most legal authority for cooperative research rests in the area of specific commercial endeavors, a look at the legality of these endeavors may provide more instructive guidelines for testing cooperative anti-pollution programs.

factor was expressly stated when the automobile industry was under grand jury investigation as a result of its cooperative efforts to resolve the problems of smog in Los Angeles. The industry requested antitrust exemption as a prelude to the joint effort to develop automobile pollution devices. Government spokesmen discounted the industry's fears, maintaining that antitrust exemption was not required. It was explained that the grand jury investigation was one in which the Antitrust Division was investigating "cooperative efforts to suppress, not to promote the utilization of auto emission devices." *Hearings, supra* note 2, at 31. In the area of automobile safety, antitrust officials have been more specific; in a letter to the chairman of the Senate Committee considering traffic safety, Donald F. Turner, then Assistant Attorney General, stated the following:

Nor is there anything persuasive in the general argument that the vagueness of the antitrust laws prevents the formation of any cooperative effort to develop safety devices or to exchange information standards. The antitrust laws do not prohibit such arrangements where joint efforts seem necessary and constructive and are not accompanied by unduly restrictive collateral agreements.

General arguments for blanket statutory immunity from the antitrust laws for cooperative endeavors, therefore, do not appear sound. Such immunity seems to be not only unnecessary to desirable cooperation but could, indeed, provide a broad umbrella against antitrust that shelters suppression and delay in the development and incorporation of safety devices, whether or not the immunity would, in fact, be abused in this manner, the fact that such possibility for abuses exists and the fact that the exemption would lead to uncertainty as to its scope, would, in the absence of the most persuasive demonstration of necessity, all go to suggest that the general arguments advanced for antitrust immunity lack merit.

*Id.* at 542. Turner was commenting on the testimony of Mr. John S. Beugas, Vice President of Ford Motor Company, in which Beugas had stated:

Concern over the application of the antitrust laws has prevented and would prevent joint research and other cooperative endeavors to forward the use of safety devices by members of the Automobile Industry and also has prevented and would prevent the exchange of information concerning appropriate standards of safety.

*Id.* at 542.

American antitrust laws are designed to maintain competition in interstate and foreign commerce. In the environmental quality context, this policy may well be in conflict with the social interest in finding solutions to major physical problems, because cooperation may be necessary in order to find solutions rapidly. Decisions in other corporate cooperation contexts, however, seem to indicate that there is some legal sanction for such cooperative environmental quality research activities.

A. The Rule of Reason

Certain practices, such as price fixing, price stabilization, and division of markets have been held so onerous in contexts other than environmental improvement as to be per se violations of the antitrust laws. These practices would probably not be condoned by the courts even if employed solely in regard to a pollution-solving joint research project. However, where these practices are not involved, the broad judicial discretion in interpreting the Sherman Act should be used to decide the legality of cooperative research among competitors under the Sherman Act's rule of reason.

Any cooperative effort on the part of competitors runs the risk of coming under antitrust attack. Even more dangerous, however, is the cooperative effort on the part of large firms. Such an effort could lead

42. See Standard Oil Co. v. United States, 221 U.S. 1 (1911); see also Legislative History of the National Traffic and Motor Vehicle Safety Act of 1966 (Pub. L. No. 89-563), S. Rep. No. 1301, 89th Cong., 2d Sess. (1966); Hearings, supra note 2, at 2721, where the Committee included in the legislative history of the Act a section regarding the application of the antitrust laws. The committee considered a provision declaring that cooperation among manufacturers in this area (traffic safety) would not be illegal per se, but might be justified under the rule of reason, but dropped the idea on the Justice Department's advice.
to charges under Section 2 of the Sherman Act for possession of monopoly power, which is the power to raise prices or exclude competition. To establish a Section 2 violation, it is necessary to prove the existence of a monopoly obtained by a combination and the "intent and purpose" to exercise the monopoly power. Decisions indicate that where there are substantial economic justifications, cooperative actions may be legal and the policy of the antitrust laws gives way to these justifications. Two economic justifications are that cooperative ventures could be formed to share unusual risks that no single firm would undertake, and that cooperative ventures could be formed to enable the participants to achieve economies of scale in the performance of certain functions—research and development in this case—which are most efficiently carried on by units much larger than could be supported by an individual firm. The former, of course, would be the primary economic justification for cooperative research carried on by most large companies, although the latter justification could also be applied to larger firms participating in a cooperative.

Economic justifications are at least as sufficient to invoke the rule of reason as the standard of legality. The Terminal Railway and Associated Press cases, for example, indicate that a cooperative effort, even with monopoly power, is not illegal when it appears that an organization of such size is necessary to achieve substantial economies. While these cases did not deal directly with cooperative research, they do indicate that cooperation among competitors in rational areas of common interest are not illegal if the benefits are equally available to all competitors in the industry.

Only the Automobile Manufacturers case has dealt directly with the legality of joint research programs between competitors in the same industry. Dictum in one important case suggests, however, that such a research program would be tested by the reasonableness standard, and thus would not necessarily violate the antitrust laws. In

44. Id. at 809.
46. Id. at ¶ 73,598.
47. See id.
United States v. Line Material Co., the court stated:

The development of patents by separate corporations or by cooperating units of an industry through organized research groups is a well known phenomenon. However far advanced over the lone inventor's experimentation this method of seeking improvement in the practices of the arts and sciences may be, there can be no objection on the score of illegality, either to the mere size of such a group or the thoroughness of its research.

In applying the rule of reason, the courts look to all facts from which the agreement arises to determine the purpose of the agreement and its effect on competition, in an attempt to balance the competing values. If the primary purpose of the agreement is other than to restrain trade, and the purpose outweighs any adverse effect on competition that results incidentally from an attempt to accomplish that purpose, the agreement will be held not to violate Section 1 of the Sherman Act.

In the face of apparently non-competitive behavior, the existing law seems to require a double-barreled defense: that substantial economies are achieved or inordinate risks shared, and that the cooperative effort is necessary to meet these aims. The second requirement—the necessity test—is extremely difficult to identify. There seem to be at least two possible meanings: first, that the cooperative effort is the only way in which these companies could achieve the economies or undertake the risk; or second, that the cooperative effort is the only effective way in which the goals (economies) could ever be reached. The substantial enconomies test and the necessity test both impose a heavy, if not impossible, burden of proof in the normal commercial situation. In the area of pollution research, the burden is less onerous.

As a general proposition, economic and business factors leading to the adoption of a cooperative project, are important considerations in measuring the reasonableness of a project.


54. 333 U.S. at 310.

55. See Chicago Board of Trade v. United States, 246 U.S. 231, 238 (1918).


57. See text accompanying notes 108-11 infra.

58. Marquis, Compatibility of Industrial Joint Research Ventures and Antitrust Policy, 38 Temple L.Q. 1, 12 (1964). In this particular situation economies of scale means that within certain limits many operations increase in efficiency as their scale increases. P. SAMUELSON, Economics 25 (7th ed. 1967).
1. Factors Leading to Cooperative Effort

Perhaps the most persuasive justification for permitting competitors to conduct joint research is found where the parties are unable individually to conduct it, and there the particular industry is by its nature highly dependent upon research. The inability to conduct research is more likely to result from inability to achieve economies of scale in research than from a particular industry's profit situation. Economies of scale tend to prevent small firms from carrying on significant scientific research. Joint research is thus appealing to the small firm because it permits greater specialization of function, less overlapping of effort, and distribution of the cost of expensive laboratory equipment. The increasing need for exploration into basic science is a further incentive to combine research efforts. Companies can no longer afford to limit their efforts to technological research, even though research in basic science produces commercially exploitable results more slowly and less frequently than technological research because major breakthroughs demand extensive fundamental research.

Joint research is less attractive to a large company than to its smaller counterpart because the former can usually afford to finance its own research and prefers to have complete control over the goals and direction of the research it buys. The large company also prefers to conduct its own research so that it does not have to share the results with its competitors. It has been argued that competition in research produces better results than a joint effort, based on the belief that the duplication of effort inherent in multiple efforts to solve the same problems may be advantageous. This argument assumes that since researchers are not a standardized commodity there is room for significant individual variations among those seeking the same general information. However, the desire to permit such variations is a minor factor, and economies of scale tend not to be dispositive either, unless it can be shown that the cost of the venture is highly restrictive when attempted on an individual basis. As research becomes more elaborate and costly, cooperation by competing companies becomes more

60. Id.
In research and development . . . particularly research and development involving significant advances in technology, there is frequently no substitute for a practice described by that naughtiest of words—duplication.
62. Turner, supra note 61, at 158.
economically attractive. The companies avoid needless duplication of effort, while interplay between the best research brains of the cooperating companies in a joint effort toward the solution of problems is encouraged.

2. Nature and Effect of Cooperative Effort as Judged by Purpose

The decision in United States v. National Malleable & Steel Castings Co. suggests that the operation of a joint research facility may be lawful and that the purpose of such a facility would weigh heavily in determining the legality of the entire venture. National Malleable involved competing manufacturers of railroad car couplers who joined together under a trust agreement in 1916 to develop a universal railroad coupler. In 1945 operations under the agreement were terminated because of doubts as to the legality of the agreement. In an injunction proceeding brought years later to enjoin the defendants from any further cooperation under the agreement, the defendants were charged with combining to accomplish an unlawful purpose, in that they restrained trade by fixing prices, dividing business, holding down the less powerful members within their group, and permitting no others to join the group. The defendants argued, inter alia, that they had joined with others solely for the purpose of giving the country the safest and most efficient railroad couplers. They further maintained that such action resulted in the saving of lives and property and in the expedition of passenger and freight travel, and that such results were possible only through the cooperation of all concerned for the benefit of the entire nation.

The court, finding no illegality in the purposes or structure of the 1916 trust agreement, stated:

There is no question but that the operation of this industry was conducted completely under a Trust Agreement from 1916 to 1945. It seems to have been a necessary concomitant to the production of the device which America so needed at that time. Men gave up rights for the common good; they joined together and fought a little

64. Id. at ¶ 73,585. The government also claimed that the exchange of cost information between cost accountants employed by the several defendants was a part of the combination. The defendants answered that since the agreement was terminated, there were now no conditions which could properly be susceptible of an injunction. They admitted that they held patents under the agreement, but argued that the arrangement was proper.
65. Id. at ¶ 73,586. The court at the outset of the opinion indicated that since this was an injunction proceeding, the issues would be limited to conduct that was alleged to be occurring at the time of the complaint, but that the plaintiff would be permitted to go back to the trust agreement of 1916 in order to prove a current conspiracy and illegal intent.
war to save arms, legs, lives and freight and time. They had to 
vinvest instrumentalities for that purpose, as men first invented legal 
etities for other purposes. They had to create a clearing-house of 
genius and ideas and patents and parts. They were successful beyond 
expectation. At the time the country and the world acclaimed their 
results. I can see no legal wrong in their method of mutual sacrifice 
of patent rights to attain this end. I find their intentions to have 
been perfectly lawful.66

It was also alleged that the “Mechanical Committee” and its acti-

vities proved an illegal combination. The Committee was made up 
of engineers and scientists. It had custody over all drawings, and 
was alleged to have denied other manufacturers access to any of its in-
formation. The court found such activities lawful in the interest of 
standardization in order to prevent the manufacture of obsolete or in-
adequate parts in the interest of safety. The court also found that plant 
visitation and cost information exchanges were not unlawful acts in 
furtherance of a conspiracy. The court said that where substantial 
competition among the competitors still existed, and plant visitation 
was done for the purpose of improving work and to observe new ma-
chinery and new methods, there was nothing illegal in such acts. Simi-
larly, exchanging cost information to reduce cost was a perfectly valid 
activity, within this context. Ultimately, the court found no conspiracy 
and no unlawful combination or price fixing.67

The national importance of the work done by the defendants and 
their eventual success were undoubtedly important factors in the court’s 
decision, as emphasized by the extensive dicta in the case. There 
were many other factors in the case, however, which encouraged the 
court to take such a sympathetic viewpoint including the facts that 
the government had asked for help in developing a universal coupler 
and that the Railroad Safety Appliance Act of 189368 required auto-
matic couplers. Given the acknowledged success of the defendants, 
the otherwise active competition between the parties while cooperating 
in an area of common concern and the absence of blatantly restrictive 
agreements, the situation in Malleable Iron commended itself to the 
court.69

66. Id. at ¶ 73,589.
67. Id. at ¶ 73,604.
68. 27 Stat. 531 (1893).
69. Some commentators have suggested that the courts should take a more char-
itable view of joint research ventures formed for the purpose of conducting original 
and/or basic research as opposed to research intended to “invent around” or “block” 
competitors. Marquis, supra note 58, at 36. Likewise, it has been suggested that in 
scientific areas in which there has been no previous research and where there are no 
reasonable substitute products research should be permitted as a “pioneering venture” 
even though the joint research venture acquires monopoly power in the research area.
B. Trade Associations and Relations Among Competitors

The trade association, as an organization of businessmen and companies, provides an accepted medium through which members of a particular business may solve common problems. Technical or industrial research directed towards goals such as improving manufacturing processes and promoting safety, either in the industry or in the use of its products, are common trade-association activities. Its legality is well recognized under the law, however, because a trade association is usually a group of business competitors taking collective action, object or purpose—the essential contract, combination or conspiracy element of a Sherman Act violation is always present, and generally a violation will be found if the collective action of a trade association is contrary to the policies of the antitrust laws.

1. General Standards of Legal Activity

The actual conduct of industrial and technical research programs through a trade association, or by any group of competitors, seems to have given the courts little trouble from the antitrust viewpoint. The Supreme Court commented on the subject in the Line Material opinion and indirectly put a stamp of legality on the conduct of such programs. In the National Malleable case, also by way of extensive dictum, cooperative research efforts were approved. Industry standardization, for example, involves "joint action" and will automatically restrain trade to some extent. Nevertheless, standardization programs have been held not to be unlawful as restraints of trade.

Id.; but cf. United States v. Pan American World Airways, Inc., 193 F. Supp. 18 (S.D.N.Y. 1961), reversed on the ground that Civil Aeronautics Board had jurisdiction over antitrust issues, 371 U.S. 296 (1963). The rationale of such suggestions is that in areas where there is no competition prior to the entry of the "pioneering venture," the policy of maintaining competition in research should give way to the possible research benefits for society.

71. G. Lamb & S. Kittelle, Trade Association Law and Practice 110 (1956). From twenty-five to forty percent of the larger national associations do some work in this area.
73. G. Lamb & S. Kittelle, supra note 71, at 110.
74. Id.
75. 333 U.S. 287, 310 (1948); for a discussion of this case see text accompanying notes 53 & 54 supra.
because of the largely desirable consequences that are likely to flow from them in certain markets.\textsuperscript{78} Some courts have praised the independence and social usefulness of organizations devoted to the development of standards and in the absence of evidence of some additional violation, these organizations are approved. A district court, in \textit{Application of American Society for Testing and Material},\textsuperscript{79} praised the "fine work of the dedicated, selfless scientists" who guided the Society. In the \textit{National Malleable} case, the district court applauded the work accomplished and the standardization program initiated because of safety and accident prevention by the "Mechanical Committee."\textsuperscript{80} Yet, where there is evidence of a restrictive collateral agreement, the standardization program can be expected to fall. In \textit{Bond Crown \& Cork Co. v. FTC},\textsuperscript{81} the court stated:

The standardization of products, for example, would be innocent enough by itself, but not when taken in connection with standardization of discounts and differentials, publication of prices with agreement not to charge less than a minimum under patent license agreements affecting practically the entire industry, the freight equalization which we have described and such uniformity of prices throughout the industry as to leave no price competition of any sort anywhere.\textsuperscript{82}

Generally, then, standardization programs initiated because of safety and accident prevention have been upheld by the courts in the absence of agreements or methods used to achieve goals that are more restrictive than necessary.\textsuperscript{83}

The advantages of trade association activities must be made available to all members of the industry on equal terms. In \textit{Associated Press v. United States},\textsuperscript{84} an association of newspaper publishers which constituted the major single source of news was held to constitute a combination in restraint of trade and to be guilty of an attempt to monopolize trade because its by-laws offered membership to non-competitive newspapers on simple terms, but placed heavy assessments on, and a requirement of special approval for, applicants who were competitors of association members.

\textsuperscript{78} C. Kayse\& D. Turner, supra note 50, at 151; see also Note, \textit{Antitrust Problems of Trade Association Product Safety Standardization}, \textit{55 Iowa L. Rev.} 439 (1969).


\textsuperscript{80} United States v. National Maleable \& Steel Casting Co., Trade Cas. \textsuperscript{73,595} (N.D. Ohio 1957).

\textsuperscript{81} 176 F.2d 974 (4th Cir. 1949).

\textsuperscript{82} Id. at 979.


\textsuperscript{84} 326 U.S. 1 (1945).
Decrees have prohibited trade associations from setting standards that are arbitrary and that therefore exclude others, from preventing their members from engaging in a particular business, from engaging in various policing activities, and from evaluating qualifications of certain groups. It is evident that the activities of trade associations are carefully scrutinized and that such associations should use the least restrictive alternative available to satisfy their purposes.

Finally, past decisions indicate that the courts, in assessing certain cooperative agreements that do not necessarily restrain competition, look very closely at the character of the market performance during the life of the cooperative venture, and have drawn distinctions between reasonable and unreasonable collusive restraints of trade. This distinction between reasonable and unreasonable market conduct again brings the rule of reason into play. The fine distinction between legal and illegal market conduct need not be drawn in a case in which there is convincing direct and indirect evidence of the formation, observance, and private enforcement of an agreement bearing directly on the determination of prices, outputs, market shares, and the like. It is relevant in numerous trade association cases where the allegation of illegal collusion is typically based on the fact that the defendants are all members of an industry trade association through which they establish certain cooperative arrangements or agreements that may have the direct or indirect effect of inducing a restriction on competition. In such cases the courts generally place great weight on evidence of overt activities from which the existence of an actual agreement to restrain competition may be inferred. Lacking such evidence, the courts appear unwilling to infer an illegal conspiracy from the mere existence of the trade association and the cooperative activities conducted under its aegis. The courts’ reluctance appears rooted in the judicial view that actual violation of the law involves intent or purpose to restrain competition. In effect then, under the present interpretation of some trade association cases, a certain range of activities

90. See text accompanying notes 63-83 supra.
91. See Sugar Institute, Inc. v. United States, 297 U.S. 553 (1936).
rectly conducive to an increased restraint of competition appear to be legal.

2. Patent Practices

Agreements or arrangements under which business concerns pool or exchange patents or patent rights may restrict competition or restrain trade and hence violate the Sherman Act. In many cases cooperative effort in research and development will involve the pooling or exchange of patents. At the same time the exchange of patent rights and a division of royalties are often necessary if technical advancement in some fields is not to be blocked. The Supreme Court, in the Standard Oil Co. (Indiana) case, for example, refused to hold a patent exchange illegal per se where the exchange did not result in a monopoly or restriction of competition in either the licensing of the patents or in the production of gasoline.

Trade association activities in relation to patents have two aspects, patent ownership and patent exchange. Actual ownership of patents may be vested in the trade association by assignment from the patentees or the patentees may simply give the association power to license the patent on a royalty-free basis. This latter arrangement is not unknown to industry. The Automobile Manufacturers Association is widely credited with have accelerated the development of the auto industry through patent exchange systems. The Automobile Manufacturer's program was established in 1914. Under this program, 136 companies agreed to exchange existing patent rights without royalties for ten years. The companies also agreed to exchange the rights to patents acquired during the ten-year period and to make available to all other auto makers the licenses to all patents included in the program. As many as 1700 patents have been included in the exchange at one time, and the agreement has been extended for varying periods ever since 1915. The basic legality of patent exchange was summarized in the Cutter Laboratories opinion, where the Court of Appeals for the Ninth Circuit said:

Patent pools and cross-licensing agreements, when formed in a legitimate manner for legitimate purposes are not illegal in themselves. It is only where the agreements are used to effect a

95. G. Lamb & S. Kettle, supra note 71, at 110.
96. Id. at 111.
97. Id.
98. Cutter Laboratories v. Lyophile-Cryochem Corp., 179 F.2d 80 (9th Cir. 1949).
restraint of trade or a monopoly that they violate the law, as when they are used to fix prices . . . to suppress competition from unpatented articles . . . or to monopolize an entire industry by pooling the dominating patents and allocating fields of manufacture among companies which would otherwise be in competition.99

As this quotation indicates, the purpose for the patent exchange, its methods of operation, and its ultimate effect on competition may be considered in determining its legality.

C. Cooperation in Health and Safety Research: Automobile Manufacturers’ Antitrust Suit, a Guide to Antitrust Liability

In 1952, Professor Haagen-Smit hypothesized that unburned hydrocarbons emitted by motor vehicles contributed to the formulation of photochemical smog under the special conditions present in the Los Angeles Basin.100 This discovery prompted widespread demands in California that vehicle manufacturers, individually and collectively, take immediate action.

In response to this situation, the domestic car manufacturers felt that in addition to cooperation in other areas, the exchange of technical information through committees of the Automobile Manufacturers Association was essential. Committees were established at an early point to work on the fundamental problems of data collection, instrumentation and control devices.101

The automobile manufacturers claimed that experience in these committees demonstrated that some additional legal safeguards were needed to facilitate the desired exchange of information, which everyone connected with the operation believed was necessary to solve the emission problem as rapidly as possible. In 1955 the manufacturers entered into a cross-licensing agreement aimed at encouraging the free exchange of information among company engineers.102

The agreement contained four principal provisions. First, the agreement was to be open to all vehicle manufacturers or suppliers able to contribute to the growth of technology in the emission field. Parts manufacturers as well as vehicle manufacturers joined the agreement.

99. Id. at 92.
100. See Haagen-Smit, Chemistry and Physiology of Los Angeles Smog, 44 IND. & ENG. CHEM. 1342 (1952). The conditions peculiar to Los Angeles emphasized by Professor Haagen-Smit are low wind velocity, relatively high atmospheric temperature, and low altitude inversion layer.
102. Id.
Second, the agreement was limited in subject matter to specific categories of “licensed devices” concerning technical information that the parties had an obligation to disclose. These categories were confined to those areas which would show the greatest promise for reducing vehicle emissions. Third, the signatories obligated themselves to exchange technical information to the fullest extent possible with respect to these categories of “licensed devices.” They had a duty to disclose under the agreement without waiting for the issuance of a patent or the publication of a technical paper, thereby encouraging the prompt exchange of research and development information. Fourth, a royalty free license was to be available to all signatories in the areas covered by an agreement.\(^{103}\)

The fears of the automobile industry as to possible liability for cooperative action in search of a solution to the auto smog problem were realized in 1969, when the Justice Department’s Antitrust Division filed a complaint which alleged that the defendants had conspired to delay and obstruct the development and installation of pollution control devices.\(^{104}\) The complaint charged that the defendants entered into various agreements aimed at retarding the research and development of pollution control devices and delaying the installation of such devices. It also charged that the cross-licensing agreement of 1955 and the program facilitated by that agreement produced anticompetitive effects which amounted to a violation of the Sherman Act. The defendants maintained that the cooperative effort had expedited the research and development of control devices through the exchange of technical information at the earliest possible stage. The defendants also argued that substantial progress in reducing emissions had been achieved, and emphasized that collaboration was necessary in this field so as to insure that all manufacturers might comply with increasingly stringent government standards.

The case was resolved by a consent decree\(^ {105}\) prohibiting the defendants from: (1) restraining in any way the individual decisions of each auto company regarding the date when it would install emission control devices; (2) agreeing not to file individual statements with governmental agencies concerned with auto emissions and safety standards, and from filing joint statements on such standards unless the gov-

\(^{103}\) Id.

\(^{104}\) See text accompanying note 51 supra.

\(^{105}\) United States v. Automobile Mfrs. Ass’n, Trade Cas. ¶ 72,907 (C.D. Cal. 1969). The right of those regulated to discuss collectively the demands of government and collectively to agree or disagree to those demands has been held to be a basic constitutional right. Eastern R.R. President’s Conference v. Noerr Motor Freight, Inc., 365 U.S. 127 (1961); United Mine Workers v. Pennington, 381 U.S. 657 (1965).
ernmental agency involved expressly authorized them to do so; (3) continuing the 1955 cross-licensing agreement and refusing to grant royalty-free licenses on auto emission control devices under patents subject to the 1955 agreement to all who may request them; (4) agreeing to exchange their companies' confidential information relating to emission control devices or to exchange patent rights covering future inventions in this area; and (5) continuing their joint assessment of patents on auto emission control devices offered to any of them by outside parties, as well as their practice of requiring outside parties to license all of them on equal terms.\(^{106}\)

Consent decrees are used to terminate antitrust litigation for a number of reasons.\(^{107}\) Since consent decrees amount to an agreement between the parties to the dispute, with little judicial scrutiny,\(^{108}\) the *Automobile Manufacturers* decree provides little legal guidance. Nevertheless, the provisions of the complaint and decree are indicative of the Justice Department's attitude toward such endeavors. The mistakes made by the defendants thus provide a basis for an analysis of the basic policy questions involved.

The Justice Department's complaint charged that the cooperative program of the automobile manufacturers produced anti-competitive effects, in violation of the Sherman Act. Specifically, the charge was restraint of trade in the research and development of pollution control devices.

Any allegation of anti-competitive effects in a particular area assumes that in the absence of the challenged conduct the normal competitive forces of the particular market would have encouraged production of the specific commodity—in this case, research and development of pollution control devices. This, of course, raises the recurrent question\(^{109}\) of the actual extent of current competition in the given area, and the effectiveness of such competition in achieving a solution to pollution problems in the shortest possible time. Used in its traditional sense, an allegation of "anti-competitive effects" may contain assumptions not present or perhaps not appropriate to combined efforts to find a solution to problems of health and safety.

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107. S. Oppenheim & G. Weston, *Federal Antitrust Laws: Cases and Comments* 844 (3d ed. 1968). Among the reasons listed are: (1) the economies, both to the government and the defendant; (2) informality; (3) avoidance of trial; (4) avoidance of possible liability under Section 5(a) of the Clayton Act; (5) the opportunity to find out what may legally be done; (6) avoidance of publicity incident to a trial.

108. *See generally*, id. at 843-54.

109. *See text accompanying notes 14-55 supra.*
The performance of industry to date in the arena of pollution control and abatement has been less than adequate. The efficiency of such efforts, where they have existed, was quite limited until a few years ago. The market forces that prod an industry into a competitive response have been absent.\textsuperscript{110} The "normal" market forces in the area of pollution control seem to be substantial government regulation and quality standards; industry has not responded to these induced "market forces." Regulation in this area, at least so far, has not been an effective substitute for competition. This is not to say that there cannot be effective competition in the search for means of eliminating or controlling pollution, but that we may have reached, or are rapidly approaching the point where the social cost of further delay will outweigh the benefits derived from maintaining a rigorous application of the antitrust laws in this one specific area.

In most areas of research for new products and ideas, maintenance of competition may result in a more equitable division of profits between consumers and industry than when there is a research monopoly. However, if research is to solve pressing environmental problems, the consequences of competition and division of effort and labor, as well as the duplication of effort that will take place when more then one company seeks a solution to the same problem, must be weighed against the environmental costs caused by possible research delays. Competition in research, in the normal competitive situation, would eventually isolate the most useful technological innovations. The best researchers would be rewarded by the translation of their research into profitable results or products, while the less fortunate researchers would be penalized, and perhaps eliminated by the competition. Yet the need for improved technology to control pollution does not pre-

\textsuperscript{110} It has been suggested that the market system can be made to operate competitively through a system of incentives, or a system of "effluent fees." However, most government officials feel that we do not have the time to wait for a market response and emphasize laws such as the Clean Air Amendments of 1970, 42 U.S.C. §§ 1857 et seq. (1970), and increasing governmental assumption of direct responsibility rather than any commitment to the indirect pressures operating through market incentives such as effluent fees. Wolozin, \textit{The Economics of Air Pollution: Central Problems}, 33 LAW \& CONTEMP. PROB. 227, 233 (1968).

Effluent fees would in essence be charges which would reflect the marginal costs of the pollution inflicted upon others. These effluent fees would be designed to bring the level of pollution down to tolerable and acceptable limits. Effluent fee schemes have been enthusiastically advanced as the logical alternative to direct governmental intervention through regulations stipulating standards and prohibiting certain pollution-creating activities. \textit{Id.}

sent the normal competitive situation. Indeed, the need for more efficient technology is urgent. Research cooperation would more expeditiously meet this problem.

The basic policy of the antitrust laws may be defeated by strict legislation in the area of pollution control. First, where competition on environmental improvement problems is carried on by individual efforts, the first to find a solution—perhaps the only company financially able to afford the high cost of individual research in this new, economically unproductive area—may effectively eliminate the smaller competitors from the market and may be able to reap monopoly profits by selling his solution to others that must also comply with the regulations. Second, the possibility of achieving a voluntary solution may redirect much of the money now spent by industry fighting the regulations and lobbying for exceptions to these laws.

CONCLUSION AND RECOMMENDATIONS

In an environmental context, our price system fails to take into account the environmental damage that the polluter inflicts on others. Economists call these damages "external social cost;" Paul Samuelson defines these costs as "external diseconomies." Whatever they are called, they represent a very real cost to society. A recent report submitted to the Department of Commerce on motor vehicle air pollution concludes:

[A]ir pollution represents a classical example of ‘external diseconomy’, which results when there are inadequate market forces to compel consideration of the cost imposed by an action on others in the society. With respect to the automobile there are inadequate incentives either for the manufacturer to install control equipment in advance of competition or for the individual purchasers to assume the additional cost of such equipment prior to a public requirement for all purchasers to undertake a similar burden.

At the present time, because pollution control is an external cost, the major cost of research and development in the pollution area is borne by the taxpayer in the form of government-financed research.

111. COUNCIL ON ENVIRONMENTAL QUALITY, ANNUAL REPORT 12 (1970).
112. Samuelson, supra note 58, at 453.
114. Not only is the cost of government-financed research passed on to society, the fact that pollution exists at all is a cost to society. The salient economic consequence of this problem in the area of air quality is that pure or relatively unpolluted air is no longer a free good; it costs money to go where air is relatively cleaner, or to trap pollutants before they escape into the air. Yet, by and large, those who are responsi-
If cooperative research is permitted, not only will substantial economies be realized by individual firms within an industry, but the cost of abating pollution will be shifted somewhat to the private sector. A cooperative effort may also enable firms within an industry to participate in the joint effort, although they would have been unable to do so individually. The public interest would further be served in that a cooperative effort would probably produce faster results than the present divided efforts. The speed with which economies in the use of resources are effected is of consequence to the public. The argument that in the long run it is better to sacrifice some speed for the sake of more competitive forms of utilization of resources is not appropriate to a situation where the gravity of the problem multiples geometrically.

Aside from the general proposition that competition is a far better means of achieving a desirable distribution of cost throughout society, the major concern of antitrust officials and some commentators on this subject centers around the fear that any cooperative effort will invite collaboration on matters not crucial to the announced purpose of solving pollution problems. In addition such an effort would restrain competition in research and development. The former problem can be resolved by close antitrust scrutiny of the cooperative effort. The latter problem was raised and discussed earlier in this paper.

It would seem that since there is a decided absence of competition in pollution control among the major producers in industry, any reduction in the number of independent decision-making units in the area of pollution control would not have competitive significance—at least for the present. Society and industry in general are faced with a unique and serious environmental threat; a joint response to this threat could be a relatively short term affair compared to the present individual efforts and would not really threaten competition among participants in other areas.

Current interest in the topic of pollution and impending regulations has resulted in an increasing awareness by many industries that they are in a position to correct environmental problems. The antitrust questions raised by cooperative efforts are not answered by existing law in most instances; there is little judicial precedent relating to such

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115. C. KAYSEN & D. TURNER, supra note 50, at 136-41.
116. See Turner, supra note 61, at 158, and accompanying text.
117. See Turner, supra notes 35 & 36, and accompanying text.
118. See text accompanying notes 109-11 supra.
action. Authority for cooperative action must, therefore, be extrapolated from cases in other areas of endeavor that must be read very narrowly, especially in light of recent statements from Justice Department officials and the decree in the *Automobile Manufacturers* case. It is probable, however, that the rule of reason is applicable to cooperative activities that are *clearly* in the best interest of public health and safety. Thus, there is some chance that permissible cooperative activities can take place under the antitrust laws as presently interpreted.

The government must recognize that there is a substantial policy conflict between the antitrust laws as a safeguard of free and open competition and the great public interest in seeing the environment cleaned up quickly. In light of the extreme difficulties facing all efforts in this area, resolution of the issue should be in favor of the public interests in improving and preserving our environment for future generations.

In order to accomplish the goals of improving and preserving our environment, an industry that wishes to attempt cooperative research should at least follow these steps. First, set up a separate corporation to avoid all connections with any of the parent or founding corporations. If the industry already has a trade association, a separate branch of the association might be used. Second, limit the goals and purposes to research and development of new processes of pollution control or non-polluting products. If an existing trade association is used, this factor is even more important. Research in the pollution area should not be combined with other general or common industry goals. Third, technical information exchanged should be limited to technical evaluation of new processes in pollution control or non-polluting products. Fourth, the separate corporation should not be a conduit for generalized technology or know-how. Fifth, all personnel should be independent of their parent corporations. Finally, all

119. See note 105 *supra*.

120. Turner, *supra* note 45. Turner gives three characteristics where cooperation in health and safety may be of use; (1) "[Where] there is no other less restrictive method of achieving the goal;" (2) "that the agreement makes a material contribution to health and safety," and (3) "that there is no doubt or dispute that such a contribution to health and safety will result." 61 Nw. U.L. Rev. at 869 (1967).

121. In recognition of both the present and potential costs to society, increased importance has been given to the devising of means to detect and control pollution. It is also becoming clear that, because of the damage to life and property, expenditures on pollution control and abatement are as essential to society, if not to individual polluters, as investments in education, urban renewal, and other investments in social capital. Cassell, *The Health Effects of Air Pollution and Their Implications for Control*, 33 LAW & CONTEMP. PROB. 197 (1968).
technical information, products or processes should be available to all applicants upon reasonable terms.

The federal government is pouring dollars into research to acquire better know-how; but this is not enough—industry must contribute its share. Government sanction of industrial cooperation in this area would stem the flow of industry dollars into public relations and redirect industry money to meaningful research and development. Ignorance about the long-term effects of pollution as well as changes in the environment brought about by pollution-control methods and technological innovation point out the need for much more research in this area.¹²²

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¹²² The President's Council on Environmental Quality put it this way:

The pace of technological innovation has exceeded our scientific and regulatory ability to control its injurious side effects. The environmental problems of the future will increasingly spring from wonders of the twentieth century.


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