

## INDUSTRY AND ENVIRONMENT

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**Abstract**—This paper deals with the relation between our natural and physical environment and industry, but must, of necessity, refer also to the related concerns of the other parties involved in protecting the environment—namely, governments, the public and the labour unions.

This paper starts with a brief examination of the implications of present costs and benefits of environmental protection to a number of countries; it then goes to review intergovernmental cooperation on environmental matters as developed within the framework of OECD. Then, I will be brave—or foolish—and try to look at the next ten years and indicate what new environment protection measures may be instituted. Finally, I will attempt to show the different ways in which industry in the various countries may act when faced with such measures, and what this may mean for international cooperation.

“We all know that industrial discharges can seriously affect the environment. That is why industrialists must act with great responsibility.” But in what way and how? These are the questions that have appeared as the environment protection movement has developed in many countries.

A high point of this movement was the Stockholm Conference on the Human Environment, held in this very room in the summer of 1972. Now, since the enlightenment in Stockholm two and a half years ago, what has been achieved? There has been large-scale investment by industry in protection of the environment, and investments are planned to continue for years to come. Industries have had benefits—CIBA-GYGA, H<sub>2</sub>SO<sub>4</sub>, cement.

What benefits have accrued to the environment from all this expenditure? We really don't know. In some countries, like Sweden, there is good evidence that

substantial benefits have occurred. For instance, thanks to the massive investments that were made in sewage treatment plants, as His Majesty has already indicated, it is now possible to swim safely here in the river in the centre of Stockholm, which was not the case some years ago. Incidentally, these investments were very wisely phased to occur during down-turns in the economic climate of Sweden. In England species of fish are to be found in the Thames near London which have not been seen there for decades. PCB and mercury emissions have been reduced in most OECD countries.

But, in many of the 24 OECD countries *no* comprehensive analysis of the state of the environment exists. The reason for this lacuna is the lack of monitoring of the air, water and soil. Monitoring may be technically difficult, expensive and perhaps, in some countries, the results might be embarrassing to public authorities. But if we are to go beyond simple public reactions as the basis for public and private decisions, to an effective cost benefit analysis with regard to environment protection, we must develop and install effective monitoring systems in all our countries.

In most environmental problems there are four interested parties: the public, the labour unions, industry, and the government. I find it impossible to speak of industry and the environment without also including the public, labour unions and government. Protection of the environment depends on all four parties. They are interdependent when it comes to the environment, and so adequate environment protection means that all four must understand each other and must, to a greater or lesser extent, cooperate.

Let me take as an example, the case where public concern develops over a possible danger to the river life caused by a chemical effluent. There is a suspicion that it is damaging to the biota. What concentration of the chemical should governments permit to be present in the river? and what amount of the effluent containing the chemical should each factory be allowed to emit? This is the classical, simple problem of water pollution control, and it has about as many answers as there are countries. The problem may be further complicated, if one considers to what extent factory workers should be exposed to the chemical. Some countries require scientific research *with proof of damage* at certain concentrations to serve as the basis for setting water quality standards; others settle for a *strong suspicion* of damage at a certain concentration. What does one do when it is not possible to prove with 100% accuracy that damage is occurring at a particular concentration? Here is where the enlightened public comes in. If they understand the situation, in theory at least, they could choose to reduce the risk to the environment and have industry or the consumers pay for

Table 1. Total expenditures on new programmes of pollution control as a percentage of total GNP over the programme period

A. 1971-1975	
United States	0.8
Germany	0.8
Sweden	0.5-0.9
Italy	0.4
Japan	3.0-5.5
Netherlands	0.4
B. 1976-1980	
United States	1.7
Italy	1.3
Netherlands	1.3
C. 1971-1980	
United States	1.4
Netherlands	0.9
United Kingdom	0.3-0.5
Italy	0.9

Source OECD, Economic Implications of Pollution Control—A general assessment, Feb. 1974.

Table 2. Pollution control costs in the iron and steel industry

	Pollution control Capital expenditure as a % of total capital expenditures	Annual pollution Control costs as a % of total production costs
United States Period 1974-1983	14-17%	4%
Sweden Period 1970-1973	8.5	1

Source: Extracted from the undergoing OECD study on pollution control costs in the iron and steel industry.

the cost of controlling the effluent. Or, they could accept the risk, and industry could avoid the payment. Either choice may vitally affect labour in that industry. However, it is rare to see environmental arguments expressed in these basic terms.

Now let me turn to inter-governmental cooperation. OECD has been carrying out cooperative activities in the field of the environment for about 10 yr—at the beginning we simply called it "air and water pollution control". Last November, Ministers responsible for the environment met at OECD under the chairmanship of Mrs. Gro Harlem-Brundtland, the Norwegian Minister for the Environment. They adopted a "declaration" stating, among other things, that:

- (1) the protection and progressive improvement of the quality of the environment is a major objective of the OECD Member countries;
- (2) the improvement of the environment should reflect and promote a new approach to economic growth that will take into account all components of the quality of life and not only the quantity of goods produced. Therefore, economic and social development policies must be pursued in close connection with sound

environment policies, in order to ensure a balanced contribution to the improvement of human well-being.

Among other agreements perhaps of equal or more importance, the Ministers endorsed ten specific recommendations to their governments on environmental policies, covering almost the total field of environmental matters. Of particular interest to this Congress are:

A recommendation on Strategies for Specific Water Pollutants Control, which calls on the governments of the Member countries to *intensify their efforts*:

- (i) to identify pollutants of *particular significance* in the water environment, their origin and pathway through the water bodies;
- (ii) to prevent these pollutants from reaching water bodies by all appropriate means such as modification of industrial processes, recovery and re-use, product substitution and treatment of pollutants at source, utilising improved technologies;
- (iii) to assess the investment required to achieve the desired level of water quality.

A recommendation which calls on governments of Member countries to *take measures to reduce* the pollution of surface waters which results in eutrophication, with particular reference to the problem arising from the transfer of nutrient loaded waters across frontiers.

A recommendation stating that governments *should make all efforts* to ensure that, prior to marketing of chemicals and chemical products, their potential effects on man and his environment be assessed.

Perhaps the most important recommendation adopted was that relating to the Principles Concerning Transfrontier Pollution, which should be of real use in helping countries settle disputes over pollution crossing national boundaries, and has, in fact, already been used by two OECD countries as a basis for settlement of a local

Table 3. Pollution control capital expenditures as a percentage of total capital expenditures for selected industries in Japan in 1971

Thermal electric power generation	17.7
Iron and steel	10.0
Petroleum refining	14.1
Petrochemical	5.1
Mining	15.7
Non-ferrous metal	12.1
Pulp and paper	14.2
Cement	8.5

Source: M.I.T.I., Japan.

Table 4. Expenditures on pollution control welfare oriented expenditures and defence expenditures as a percentage of GNP

	Pollution control 1971-1975	Defence 1970	Residential building average 1967-1969	Education	Health
United States	0.8	8.2	3.5	7.5 (70)	7.0 (70)
Germany	0.8	2.9	5.4	7.8 (68)	3.9 (69)
Italy	0.4	3.6	6.6	5.5 (70)	5.2 (70)
Sweden	0.5-0.9	3.8 (69)	6.1	5.2 (69)	6.3 (69)
Japan	3.0-5.5	n.a.	6.9	5.9 (65)	2.0† (70)
Netherlands	0.4	3.5	5.5	5.5 (70)	4.6‡ (70)

†Government only.

‡Private sector only.

Source: OECD, Analysis of Costs of Pollution Control, 1973.

Table 5. Capital expenditures by U.S. business for the abatement of air and water pollution for selected industries estimated 1973 and planned 1974

Industries	Expenditures for new plant and equipment (millions of \$)			
	1973		1974	
	Pollution abatement (air, water)	In % of total capital expenditure	Pollution abatement (air, water)	In % of total capital expenditure
Blast furnace, steel works	230	16.3%	381	22.2%
Non ferrous	523	31.1	553	25.6
Motor vehicles	143	6.3	178	6.6
Stone, clay and glass	144	9.5	282	16.7
Paper	355	18.7	500	20.1
Chemical	416	9.6	608	11.5
Petroleum	555	10.2	926	13.4
Electric utilities	1409	8.6	1651	8.7

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Table 6. Pollution control costs in the pulp and paper industry in the OECD countries for 1970, and estimates for 1975 and 1980

Country	Semi-chemical pulp Pollution control† costs (water, air) (\$ per ton)			Sulphite pulp Pollution control† costs (water, air) (\$ per ton)			Non integrated sulphate pulp Pollution control† costs (water, air) (\$ per ton)			Integrated sulphate pulp and paper Pollution control† costs (water, air) (\$ per ton)		
	1970	1975	1980	1970	1975	1980	1970	1975	1980	1970	1975	1980
	Belgium							8.71	11.51			
Canada	0.25	6.03	8.78	0.62	11.22	17.22	1.15	5.22	7.53	0.03	5.02	6.57
Finland	3.55			2.65			0.72			0.67		
France					14.12	23.40		5.22	11.03		5.51	7.04
Germany												
Italy		25.00						24.00			16.00	
Japan	3.33	13.98		8.33	22.24		1.38	6.68		1.55	7.62	
Netherlands	3.60	3.60	3.60									
Norway	0.21			0.64			0.63			0.12		
Sweden				2.87	9.76	15.91	1.45	4.42	8.20	1.64	5.25	7.38
Switzerland					15.00	15.00						
United Kingdom												
U.S.A.	2.31	12.11		3.47	18.01					2.21	11.80	

†Based on exchange rates prevailing in December 1970.

Source: OECD Study on Pollution by the Pulp and Paper Industry, 1973.

Table 7. Pollution control costs in the pulp and paper industry in the OECD countries for 1970, and estimates for 1975 and 1980

Country	Newsprint Pollution control† costs (water, air) (\$ per ton)			Other paper & board Pollution control† costs (water, air) (\$ per ton)			Fibre building board Pollution control† costs (water, air) (\$ per ton)			Total Pollution control investments (\$ millions)		
	1970	1975	1980	1970	1975	1980	1970	1975	1980	1971-75	1976-80	1971-80
	Belgium				1.63	3.06	3.19					
Canada	0.51	3.55	6.55	0.13	3.23	3.69	0.34	2.49	2.56	308	372	681
Finland	0.15			0.46			0.37			92		
France	0.12	2.68	2.68	0.40	0.72	1.29						
Germany	0.57	0.64	1.44	3.14	3.52	5.47						
Italy		2.00		0.37	3.50							
Japan	0.37	3.02			5.71					337		
Netherlands		5.70	5.70	0.70	2.60	5.30				20	28	48
Norway	0.33			0.03			0.75					
Sweden	3.62	4.86	4.01	1.35	4.14	4.18	1.15	2.68	4.21	231	264	495
Switzerland	1.19	1.64	1.98	1.98	2.09	2.16						
United Kingdom				0.98	1.37	1.05				13	9	22
U.S.A.	0.91	3.75		1.30	4.69					1844		

†Based on exchange rates prevailing in December 1970.

Source: OECD Study on Pollution by the Pulp and Paper Industry, 1973.

dispute. The recommendation embraces a number of legal concepts, such as the principle of non-discrimination which states that "polluters causing transfrontier pollution should be subject to legal or statutory provisions no less severe than those which would apply for any equivalent pollution occurring within their country, under comparable conditions and in comparable zones. It also contains the *principle of equal rights of hearing*, which should allow victims of transfrontier pollution to appear in the courts where the pollutant *originates*—a principle well known in the Scandinavian countries, but now extended to all of Western Europe (with the exception of Spain), to Canada, the United States, Japan, Australia and New Zealand.

A plan to monitor the extent to which all ten of these recommendations are being implemented by the governments is now under consideration.

I will end my remarks about OECD by indicating what is presently being studied cooperatively by the 24 Member governments in the field of water pollution.

It is a study of some 20 families of specific water pollutants which are bi-products of industrial activity. One aspect deals with advanced *technologies* for water treatment, and a second with alternative *strategies* for pollutants control in various industrial sectors—initially in the electroplating, textile and petro-chemicals industries.

Now, what can be expected in the next 10 yr?

Assuming that the present recession is followed by a period of exponential economic growth, constrained mainly by fears of insecurity of supply of energy and natural resource, it is my contention that *new* environmental protection measures will be developed in many countries.

My reasons for this are:

- a likely and well-founded increase of concern about the saturation of the assimilative capacity of the environment (air, water, soil) in industrialized areas, particularly those areas on the coast or at estuaries;
- further efforts by the environmental political action groups to expand protection measures during a period of economic growth;
- government interest in increasing the security of supply of raw materials and energy and reducing balance of payments deficits which may lead governments to intervene in the market economy to encourage the conservation of natural resources and the recycling of materials—both intimately related to expanded environment protection.

Such an expansion of controls to protect the environment may be expected to take some of the following forms:

- (1) Government control over new plant location based on *planned limits* of total emissions *in a region* to air, water or soil, or perhaps even total environmental emission limits (Japan);
- (2) Government control over installation of new plants based on planned total energy load for a given region, or total water use for the region (Western Australia and Western United States);
- (3) Control of waste disposal, based on many considerations, including limitations on the disposal of new and old scrap, or considerations that all waste of a certain size or type, such as non-biodegradable or toxic, be subject to control (Oslo and Paris Conventions);
- (4) Governments may impose controls on processes to be used in production—for example, processes that call for genetic modification of enzymes or bacteria may be forbidden (believe Sweden);

- (5) Industry may accept responsibility for the *ultimate* disposal of products, and perhaps also design products with such functional characteristics as bio-degradability or separation into disposable modules (France);
- (6) Governments may require that product lifetime be extended and that there be standards of construction and limits as to the type of materials used (Denmark);
- (7) The introduction of certain new products on the market may be controlled by requiring screening, testing and monitoring (Switzerland, Sweden, Japan);
- (8) All plants making certain existing products may have to meet certain emission standards or be shut down at the end of a ten year period; Governments may treat individual plants differently;
- (9) Governments may require "least cost solutions" for the control of specific pollutants from a particular area or district (Japan);
- (10) New plants making existing products may have to meet much more stringent standards than older plants (again Japan);
- (11) Furthermore Governments may require that monitoring be paid for by industry and reported continuously or regularly to government;
- (12) Governments may require compensation for damage caused to the environment to be paid to municipalities, districts, or individuals, and paid by companies on a *pro rata* basis according to their emissions in the district (Japan);
- (13) Governments may set emission standards for many presently uncontrolled pollutants based on the latest research information, or a theory of risks, or the best available technology, or the best practical technology, or on considerations of the total environmental stress on an individual in a lifetime, or on a theory of how to use the assimilative capacity of air, water and soil in an optimum manner (many OECD countries are considering expanding control to other pollutants).

#### HOW WILL INDUSTRY REACT TO THESE POSSIBILITIES?

There would appear to be three broad choices for industry

- (1) to become strong adversaries of government and comply reluctantly with regulations;
- (2) to become an independent, but responsible, body of society, seeking to be self-regulating and self-policing in environmental matters, but prepared to comply with reasonable regulations;
- (3) to become a partner of government in the formulation of pollution control regulations and prepared to actively comply with all regulations.

Choice No. (1) is one where industry can attempt to influence government *not* to adopt constraining regulations and, if adopted, industry can delay in carrying them out. This could provide a lawyer's paradise. It is likely to lead ultimately to even greater attempts by government at regulation, and finally to partial compliance in a rather unpleasant social climate. This would appear to be the choice of a few firms in the United States and elsewhere.

Choice No. (2) is the one in which industry can take the attitude that it wishes to be independent of government control as much as possible, but also wishes to be a responsible member of Society. To this end, industry would adopt principles to guide its behaviour such as those recently adopted by the International Chamber of Commerce and called "Environmental Guidelines for

World Industry". Time does not permit me to quote the 34 guidelines, but the one that appears the most significant to me is No. (8):

"Industry should make every effort to anticipate the environmental consequences of its operations and take appropriate action to protect the environment; this being likely to prove less costly in most cases than restoration and compensation."

Past experience, outside the environment field, would tend to indicate that industrial codes of conduct and self-policing by industry do *not* work in highly competitive industries made up of many small firms, but may work in an industry working close to oligopolistic conditions. Even if it does work for a few industries, the pollution as a whole in a country may be considered so bad that an aroused public will force government action, that will impose controls on both innocent and guilty in industry. A number of multinational firms appear to have opted for choice No. 2.

The third choice to industry is that it may decide to enter into *partnership* with government to develop and implement a programme for environment protection which will give industry an active voice in determining the feasibility of various control measures at the price of some loss of freedom of action. Such a partnership would bring to government the latest information available to industry about process technology, emissions, and control costs, and possibly even profit margins. It would allow industry and government to arrive jointly at emission standards based on knowledge of latest scientific developments in the field, and plans for economic development of the region where the plant is located, as well as the more usual technological and economic factors.

In order that the public feel that this relationship is not to the detriment of the public interest, it would be

necessary that there be *open* agreements between government and industry, openly arrived at, with the possibility of public participation before any decision is taken. Choice No. (3) certainly appears to an outsider like myself to be the one adopted by Swedish industry.

The consequences for international trade of these relations between industry, government, the public and labour unions could be upsetting, although the information available suggests that the likelihood of significant trade distortions is largely exaggerated. To prevent trade distortions resulting from environmental regulations is one of the main preoccupations of the OECD, and to this end the Member governments have adopted a set of guiding principles, including the well-known "polluter pays principle". In the next ten years it may be necessary for additional international agreements to be reached, which attempt to *harmonize* the environmental policies of the various countries for the good of all. But first, industry, government, the labour unions and the public in each country must clarify their respective roles in protecting the environment.

I should like to conclude by stating that this Congress, with its focus on the technology for waste water control, can furnish one of the key tools to ensure that society makes the right response to the world of 1985, by providing in good time the means to protect our environment, while allowing economic growth to continue. Technical ingenuity is necessary, and exists in abundance; it can lead to products and processes which satisfy individual and collective needs, and can do it while protecting the environment for today and for those who will come tomorrow. But to fully utilise this technical ingenuity, we must *also* invent ways whereby men with *different interests* will want to work together for their own good and that of the planet.