POLLUTION CONTROL TECHNOLOGY ASSESSMENT

Proceedins of on Environmental Resources Conference
1974

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Proceedings
of an
Environmental Resources Conference

Sponsored by:

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Cincinnati, Ohio

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PREFACE

The need for studying the technological, economical, social, and environmental aspects of pollution control is always present. Therefore, this multifaceted assessment of our water pollution control technology is timely.

The Columbus Laboratories of Battelle Memorial Institute and the U.S. Environmental Protection Agency's National Environmental Research Center, Cincinnati, sponsored the conference. Divided into five sessions, the conference focused on the impacts, direct and indirect, on water quality which resulted from various actions taken by Government and industry, in response to environmental control regulations.

We wish to express our gratitude to the many who contributed to the success of the conference.

We acknowledge with appreciation the assistance of Mrs. Lucille G. Pierson of Battelle-Columbus and Mrs. Elaine Cole of NERC-Cincinnati, who gathered and compiled these proceedings.

With the exception of the preliminary pages, NERC-Cincinnati has produced this report as received from Battelle Memorial Institute.

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INTRODUCTORY REMARKS

F. M. Middleton
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Good Morning, I am Frank Middleton, Deputy Director of the National Environmental Research Center of the USEPA in Cincinnati, Ohio, and co-chairman of this Conference. I would like to add my welcome to that of Dr. Sunderman. Also, I want to thank you for coming to this Conference. This is the third of a series of conferences on environmental matters that have been jointly sponsored by the NERC-Cincinnati and Battelle-Columbus. The 1971 Conference was held on Design of Consumer Containers for Reuse or Disposal, and in 1973, a Conference on the Cycling and Control of Metals was held here at Battelle. Objectives in holding these conferences are to address highly pertinent and timely topics of concern to the Nation. Proceedings of all these Conferences are made available to the scientific and technical community and to leaders in policy-making positions in the country. We will have proceedings from this meeting.

I would like to tell you a little bit about the National Environmental Research Center in Cincinnati so that you will understand our role here and our role in environmental research. Those of us closely associated with environmental research often passively assume that others know a great deal about our organizations and how they work, but many surveys indicate that this is not so. In a recent survey of 3,000 people selected from a cross-section of the American public, only 10 percent of the people were able to name U.S. Environmental Protection Agency unaided. When the Agency's name was mentioned, another 48 percent said yes, they had heard of it; the remaining 42 percent had not heard of the agency. Among even those who were aware of EPA, 40 percent indicated that they knew almost nothing about the agency and only 19 percent said they knew a fair amount about the agency. In August 1971, the Environmental Protection Agency developed the concept of National Environmental Research Centers to integrate the research and monitoring activities of the agency. The centers were established in Cincinnati, Ohio; Research Triangle Park, North Carolina; and Corvallis, Oregon. A year later the fourth National Environmental Research Center was established in Las Vegas, Nevada. These centers were developed along a thematic basis so that each NERC would play a specific role in the mission of the agency. The programs, however, are not limited exclusively to the theme, but the theme serves as the foundation and nucleus for each of the installations. In Cincinnati, the theme is technology development, and it is our activity and interest in this area that led to the development of this seminar. Our programs are heavily oriented toward wastewater and drinking waters, but we also have substantial programs in the area of automobile emissions toxicology, solid and hazardous waste research, methods development and quality assurance, radiological activities, and industrial waste control and oil and hazardous waste spill technology investigated at a satellite laboratory in Edison, New Jersey. Hence, the subject matter of this conference is of significant importance to the activities of EPA at Cincinnati as well as at the other National Environmental Research Centers.

We have gone through, and are still going through, a period of passing far-reaching legislation in the environmental field.

Technology developments for the control of pollution have been proceedings with some vigor. Standards and regulations for our control of pollutants are appearing almost daily, and already, a new National Water Quality Commission is beginning work on the study of the technological, economic, social,

and environmental aspects of achieving effluent limitations and goals set forth for 1983 by the Federal Water Pollution Control Act Amendments of 1972. We, therefore, believe that it is quite timely that our water pollution control technology be assessed from a number of viewpoints.

We have assembled an outstanding group of experts to talk, and we want this to also be a discussion meeting. Hopefully, this conference will fulfill these aims. More specific details on the aims and objectives of the Conference will given later this morning.

SESSION I: TECHNOLOGY ASSESSMENT

Moderator:
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TECHNOLOGY ASSESSMENT
(Mid-1974)

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ABSTRACT

This paper does three things. First, it discusses what technology assessment is. This is done in terms of (1) the reasons for technology assessment, (2) the concept, (3) the context, (4) the definition, and (5) the label of technology assessment. Next, (6) the need for something like technology assessment is discussed; this is then followed by (7) an examination of who should do what and why in the technology assessment area, leading up to (8) the establishment of the Office of Technology Assessment in the US Congress.

Second, this paper discusses some of the similarities and differences between technology assessment on the one hand, and environmental impact assessments and statements on the other.

Third, the paper examines the newly created Office of Technology Assessment (OTA) in the US Congress.

INTRODUCTION

I appreciate the opportunity to address this audience on technology assessment. As you were just told, I have been involved in this subject for some time, and talked about it on numerous occasions to various audiences. Hence, when an opportunity such as this one arises, the question that inevitably comes to my mind is this: What can I say that I have not said sometime, somewhere before?

Based on your show of hands, it seems that most of you would welcome a brief synopsis as to where technology assessment came from, and what it is intended to accomplish. For this reason, repetition of parts of some of my previous talks should cause no problem, and therefore I will organize my presentation along the following three lines:

(1) What thechnology assessment is.

(2) How technology assessment differs from environmental impact assessments and statements.

(3) Organization of the Office of Technology Assessment (OTA) in the Congress.

WHAT TECHNOLOGY ASSESSMENT IS

Reason for technology assessment

In recent years we have become increasingly concerned about the deterioration of the quality of human life. Due to unforeseen, deleterious side effects, certain innovations like DDT, which have done a great deal of good in some ways, have endangered or degraded our lives in others. The pollution of our lakes and streams assaults our senses. Rapid population growth and the concentration of poeple in urban regions have created severe disharmonies.

Concept

Since technology plays a highly significant as well as a visible role in the solution of many of our problems, there has arisen a desire to "preplan" the use of technology better. The objective of this preplanning is to minimize the potential deleterious side effects of our actions. This has given rise to the technology assessment concept.

Context

But what we do or do not do is really up to our socio-political system, not to our scientific-technical establishment, however extensively many of our industrial products and government programs may depend on science and technology. Furthermore, science and technology represent only one set of the many "enabling mechanisms" that help us attain our objectives. Others lie in such areas as economics, management, labor, political science, institutional arrangements, etc. It is the integrated use of these enabling mechanisms, under the direction of our socio-political system, that can make the difference between success and failure. It is a mistake to look primarily at technology when something has gone wrong. It is also wrong to search primarily for technological solutions, since the best solutions generally involve a combination of technology and other means, or even a combination of non-technological means without any new technology.

Definition

For this reason, most authorities broaden the concept of technology assessment to include a great deal more than what ordinarily comes to mind when we use the term technology assessment, namely: A systematic planning and forecasting process that delineates options and costs, encompassing economic as well as environmental and social considerations, that are both external and internal to the program or product in question, with technology-related "bad" as well as "good" effects.

Label

Hence the label of "technology assessment" was found to be wanting, since it implies a narrower interpretation than what we mean by the concept today. This has caused considerable confusion. One manifestation of this confusion is a concern by some that we may be talking about technology arrestment, rather than assessment. It is generally felt, however, that it is too late now to change the label without further compounding the confusion. Instead, we decided to give "technology" a much broader interpretation than what Webster has given it.

In short, we view "technology" in "technology assessment" as a variety of "things," whether these are "technical" or not, in the strictest sense of the word.

Why is something like technology assessment needed?

The fundamental concept of technology assessment is not new, not even in its broader interpretation. What is new, however, is that today's problems that need technology assessment have become more numerous, more severe, and more complex. Also public awareness of these problems has become more acute, and insistence that something be done about them has become more vocal.

Scientists and engineers are often surprized when they find that problems of urban blights, social unrest, environmental pollution, inadequate educational opportunities and health care deficiencies do not respond neatly to scientific and technological initiatives. Even the systems approach, which worked so well in the 1950s and 1960s for developing complex missile systems and for putting man on the moon, simply cannot be used here for at least two important reasons:

(1) The objectives are much more diffuse, relating less to economics and "hard" science and engineering.

(2) The disciplines involved are much more heterogeneous, and we have not yet learned how to orchestrate them for coordinated assaults on our problems.

The apparent need for technology assessment as an integral step in the planning, organizing, and implementing of our activities today is an outgrowth of changes that have been taking place over the past several decades, some of which are:

(1)Technology and management techniques are providing more and more leverage, often with more severe consequences, shorter lead-times and greater impacts.

(2) Mistakes made are becoming more costly; there is an increase in the irreversibility of many of our actions.

(3) There is less damping; our environment is becoming less forgiving of abuses.

(4) Our goals are becoming more complex, and call for correspondingly increasingly complex interdisciplinary approaches.

Who should do what and why?

Who should do technology assessment? The answer is simply "everybody" whose contemplated actions may unintentionally but adveresely affect the environment (physical as well as social) in which he operates.

Why? It is a simple matter of striving not to cause indiscriminate damage to the environment in which we live. The government has an obligation to see to it that beneficial programs in one area do not cause more damage in another to the net detriment of the public. It is in the interest of industry not to be viewed by the public, and hence its markets, as the "exploiter"of the public's physical and social environments.

Hence, it is difficult to argue with the concept. It is when we talk about implementations that the issues become controversial.

Now that technology assessment is institutionalized, will it tend to turn to technology arrestment? Definitely not, if we keep two requirements in mind, both of which are consistent with the spirit of the movement or concept.

(1) Technology assessment, as practiced within the Office of Technology Assessment of the US Congress, must not even resemble some regulatory entity. It should be some sort of staff function, to generate unbiased assessments, by laying out options and "costs" for the public to scrutinize and for the government (and especially Congress) to study and act upon. An improvement in the quality of public debate, legislation, and program management, through a better understanding of the many variables at play, will be the true measure of the effectiveness of a technology assessment function, or more specifically of the Office of Technology Assessment (OTA).

(2) Technolgy assessment must not stifle basic research, scientific innovation, or creativity. Rather it should help us gain badly needed insights into our world of ever increasing complexity, so that in turn, our decisions and actions could become more reasoned and hence more rational.

Office of Technology Assessment (OTA)

Public Law 92-484, the Technology Assessment Act of 1972, created near the end of 1972 the Office of Technology Assessment (OTA) within the Congress of the United States.

What is most significant about this development is that perhaps for the first time, our legislative branch, which authorizes and appropriates all federal funds, and which makes the laws that govern us all, can have within its midst a high calibre, sophisticated, analytical capability to help it understand the multitude of issues of ever - increasing complexity, which Congress must resolve and act upon. The potential national marginal utility of OTA is inestimably great!

HOW TECHNOLOGY ASSESSMENT DIFFERS FROM ENVIRONMENTAL IMPACT ASSESSMENTS AND STATEMENTS

To an audience such as this one, with extensive representation from the Environmental Protection Agency (EPA), the question posed by the above sub-heading should be one of considerable interest.

Both, technology assessment, and environmental impact assessments and statements address the deleterious side effects of our actions. But, while EPA's primary concern is with the physical environment, technology assessment concerns itself with a broader spectrum, that also includes among others the social environment. Yet, it is not an easy matter to find topics which can be clearly placed within the purview of EPA or OTA at the exclusion of the other.

Two examples come to mind, which may be appropriate subjects for technology assessment, but not for attention by EPA.

(1) Potential genetic manipulations and their impacts on our general social fabric (present and future), and

(2) Large national data banks (computerized), and their implications for invasion of privacy.

Such examples are difficult to identify, and the the two major differences between EPA and OTA do not derive primarily from differences between their respective substantive jurisdictions. The two major differen-

ces derive, instead, from the following situations:

(1) The law which established EPA requires that each Federal entity prepare environmental impact assessments and statements with regard to their contemplated actions, that might affect the environment adversely; and then these statements are to be reviewed and acted upon by others, conceivably interfering with the initially contemplated program.

Technology assessment, as presently institutionalized in OTA, addresses issues on a highly selective as opposed to some all encompassing basis. The primary objective of OTA is to inform the public and aid Congress in its deliberations. It is a "staff function" to be informative...to delineate.. to enlighten...etc., as opposed to anything even resembling some regulatory function, or some other, able to bring about injunctions.

(2) EPA and its functions and responsibilities are within the executive, while those of OTA are within the legislative branch of government.

THE INSTITUTIONALIZATION OF TECHNOLOGY ASSESSMENT IN THE OFFICE OF TECHNOLOGY ASSESSMENT IN THE UNITED STATES CONGRESS

Public Law 92-484 calls for a 13 member Technology Assessment Board, including six Senators and six Congressmen, equally divided among Democrats and Republicans. During an odd-numbered Congress a Senator serves as the chairman, and a Congressman as the vice-chairman. During an even-numbered Congress the roles are reversed.

The make-up of the Board as of this writing is as follows:

Sen. Edward M. Kennedy (D-Mass.) Chairman
Rep. C. A. Mosher (R-Ohio), Vice Chairman
Sen. E. F. Hollings (D-S.C.)
Sen. H. H. Humphrey (D-Minn.)
Sen. C. P. Case (R-N.J.)
Sen. R. S. Schweiker (R - Pa.)
Sen Ted Stevens (R-Alaska)
Rep. J. W. Davis (D-Ga.)
Rep. O. E. Teague (D-Tex.)
Rep. M. K. Udall (D-Ariz.)
Rep. C. S. Gubser (R-Calif.)
Rep. M. L. Esch (R-Mich.)
E. Q. Daddario, Director OTA, (13th member)

In addition there is a twelve-member Technology Assessment Advisory Council, comprized of ten public members, the Comptroller General and the Director of the Congressional Research Service of the Library of Congress.

The make-up of the Advisory Council as of this writing is as follows:

Dr. Harold Brown, Chairman
Dr. Edward Wenk, Jr., Vice Chairman
Mr. J. Fred Bucy
Mrs. Hazel Henderson
Mr. Lester S. Jayson
Mr. J. M. (Levi) Leathers
Dr. John McAlister, Jr.
Dr. Eugene P. Odum
Dr. Frederick C. Robbins
Mr. Elmer B. Staats
Dr. Gilbert F. White
Dr. Jerome B. Wiesner

The Director of OTA is former Congressman E. Q. Daddario. The staffing of the Office is currently under way.

Just exactly how OTA will fare, and how effective it will eventually become, is just too early to tell.

First, OTA will have to get institutionally anchored to the existing system. New organizations are rarely readily accepted by the entrenched ones which they join.

Second, OTA will have to earn the respect of a kaleidoscopic variety of constituents through proving its credibility, by laying out options that are sound, and sets of likely consequences as impartially as the "value-free" nature of such consequences will permit, and by refraining from taking unique stands on issues which should be left to members of Congress, but making it easier for them to do so more rationally. And, finally, by assuring for cause, that it, OTA, will not be likened in any fashion to regulatory agencies.

OTA is indeed faced with some Herculian tasks. Its success to get institutionally rooted, and to build the respect and credibility it needs, will depend in no small measure on the subjects it will be asked to assess initially.

Should OTA confront, too early in the game, highly controversial, emotionally

charged topics, where "battle lines" have already been drawn, and powerful people have already taken virtually irrevocable positions, then OTA will get "swamped" and dismissed as an "ineffective instrument."

On the other hand, should OTA get involved at the other end of the spectrum with safe trivia, then it will be viewed as irrelevant, and simply "written off."

Initially OTA will have to address issues in the middle of the spectrum, where the subject is important enough to command attention, but not so important or controversial (due to past history) as to jeopardize the demonstrability of OTA's utility. OTA will need some early "wins." By "wins" I mean public recognition of its utility.

I do not wish to imply that OTA should stay away from highly sensitive issues indefinitely. Quite the contrary! But, first things first. I am talking about getting OTA into a position to be able to address important issues, but without being threatened in the process for the wrong reasons.

Another pitfall that OTA is facing, concerns the balance between in-depth, high quality assessments that take months and years, that OTA is likely to support one way or another, and high quality quick-reaction capabilities to assist Congress quickly, when it needs it. The former type of efforts can be and already are being supported by such organizations as the National Science Foundation (NSF). The latter, quick reaction capability is still to be established. If OTA is to be able to provide this, it will have to heavily draw on the technical and intellectual wherewhital of its very own OTA staff. Also, OTA is anything but immune to the political vageries, over which it has virtually no control.

Hence, whether OTA succeeds or fails, will depend on a number of items.

(1) The appropriate selection of the mix of issues, that OTA can manage to get itself involved in.

(2) Political vagaries over which it has no control.

(3) Last but not least the very staff of OTA. Should they fail to establish within their midst a high calibre, substantive, imaginative, politically astute capability, which does not have to go out on contract to respond to Congressional inquiries, with the "best 'quick' answer under the circumstances," then the effectiveness of OTA as a potential instrument will have been compromized, irrespective of what else will happen on other fronts.

Which way OTA will end up ultimately, is simply too early to tell as of this writing.

REFERENCES AND BIBLIOGRAPHY

This address is based on numerous articles, papers and lectures by the author, appearing in such places as:

(1) Chapter in book: Science and Technology Policies, coedited by the author, and published by Ballinger, Cambridge, Massachusetts, 1973.

(2) International conferences, meetings at: Tokyo, Japan (Japan Industrial Planning Association); Paris, France (Organization for Economic Cooperation and Development); Milan, Italy (NATO); England; Germany, etc.

(3) Testimony before the US Congress.

(4) Lectures at various universities, e.g. UCLA, Carnegie Mellon, Rutgers, etc.

(5) Various publications, such as: Harvard Business Review; Research and Development R&D; Society of Automotive Engineers, Inc., etc.

(6) Participation in panels and conferences of such organizations as: NAE, NAS, OST, IEEE, ASCE, etc.

(7) Examination of current pieces in the open literature as authored by others.

SCOPE AND PURPOSE

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ABSTRACT

As an introduction to the overall meeting, this paper states the scope and purpose of the meeting, what the initial aim is to discussions and problem solving. It deals with the matters to be covered as well as the matters which may arise during presentation and discussion. This conference is an experimental conference in which, hopefully, solutions to pollution control technology can be recognized and the interrelationships between each pollution type are dealt with in a manner whereby an answer or solution can be presented. This conference will address the basic steps involved in pollution control technology assessment. The conference itself provides a means for communication among some of the interested parties.

TEXT

Environmental problem-solving has been a learning experience. Through direct approaches to pollution problems, many technological solutions have been developed to control pollution. This progress, however, has enabled us to see the elements of environmental quality more clearly and it is now apparent that we are better transformers of environmental problems than we are solvers.

This conference is an experimental conference. It is not concerned with water pollution control technology directly. It is assumed that water pollution control technology is or can be made available to allow the control of water pollutants to any degree desired. The scope of the conference is directed at the assessment of this water pollution control technology and with the identification of the secondary effects that are brought about in our attempts to achieve clean water. The introduction to the subject of technology assessment previously made has set the stage for the broader perspectives to be addressed. Through this conference we wish to explore the subject of environmental quality through an assessment of pollution control technology.

Solutions to pollution control technology begin with the recognition that there are many interrelated factors. The assessment of the impacts of pollution control technology requires an identification of those sectors that may be impacted by the technology itself and by the by-products produced in the pollution control process. The assessment, by its very nature, requires effective communications and discussions among all of the principals involved. These include, of course, the scientists and engineers directly dealing with pollution control technology; social and behavioral scientists dealing with many of the human factors of the problem; economists directing their attention to the monetary costs and benefits of control technology; the legislators who establish the general goals for environmental quality through laws; enforcement agencies which set regulations; the industrialists and municipalities who are confronted with

the need to control water pollutants; and, of course, the general public upon whom all of the factors impact. The attainment of improved environmental quality requires solutions to pollution problems that consider all of the impacted sectors. The final step in the technology assessment involves the recognition and the explicit statement of the environmental trade-offs.

This conference will address the basic steps involved in pollution control technology assessment. The methodology for pollution control technology assessment will be discussed. Stated simply, the methodology for technology assessment provides a means to explicitly address the interrelated elements of pollution control technology. This involves the identification of the media that may be affected by pollution control technology and a consideration of the cross-media impacts involved in the solution of any problem. In response to legislation regulations are set for one medium with little concern for the other media that may be involved. It is clear by now, however, that solutions to air pollution control problems often result with residuals that have an impact on water quality and produce solid waste disposal problems. In a similar fashion, sludges produced by wastewater treatment processes must be dealt with in an appropriate manner, otherwise air pollution problems from incineration can result or land must be allotted for disposal of these particular wastes.

In addition to the media, the various types of environments must be encompassed in the technology assessment. Each of the three broad environments--the physical, the biological, and the human environment--must be considered by itself and in relation to the others.

Problem understanding is the second major element to be addressed through this conference. The speakers on the program represent many disciplines with various points of view. It is expected that through these presentations, the many variables will be identified which must be faced in pollution control technology.

The conference itself provides a means for communication among some of the interested parties. While it is necessary to develop solutions to environmental control problems, the very understanding of the problem depends upon communication of the secondary and higher order effects by the impacted sectors. The alternatives to pollution control cannot be developed without communication among all impacted sectors.

It is now well recognized that environmental quality can only be achieved if there is involvement by the impacted groups. The final step, of course, of pollution control technology assessment is the commitment to take an appropriate action which maximizes the benefit to the largest number of people and minimizes the costs involved both from a monetary and an environmental point of view.

SESSION II: LEGISLATIVE MANDATE AND STANDARDS

Moderator:
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