

Section I.-Statements by the Chairman and Vice Chairman of the Board, TAAC Chairman, and the Director of OTA

CHAIRMAN'S STATEMENT- SENATOR TED STEVENS

During 1981 the Office of Technology Assessment (OTA) provided technical analysis of a variety of topics emphasizing its role as "shared staff" to Congress. The Office released studies on issues ranging from agriculture, to MX basing, to applied genetics, in addition to conducting economic analysis of the steel, electronic, and automotive world markets.

The wide range of expertise available on the staff of OTA allows it to provide technical assistance to a diverse group of committee staffs and Senate and House offices with varying interests and needs.

Congress, like the rest of the Federal Government, is being pressed to do more with less. Congress must examine more issues with even greater scrutiny at the same time the resources available to do so become scarcer. Therefore, it is becoming increasingly important that research on complex technical questions facing Congress be coordinated among the various committees and between the two chambers.

The Office of Technology Assessment has been successful in accomplishing this goal, thus avoiding duplication of efforts. It has also been able to provide Congress with a support staff well versed in technical matters.

Congress will face a number of intricate and complicated issues this year requiring OTA'S expertise and technical capabilities. I look for OTA to be involved in a number of the major issues ahead.

VICE CHAIRMAN'S STATEMENT- CONGRESSMAN MORRIS K. UDALL

OTA was established because Congress realized that technology-related issues were assuming increasing importance in congressional deliberations. In 1981, it was evident that technology was the key to dealing with a whole host of major national needs including:

- upgrading our national defense;
- reducing our dependence on foreign oil;
- conquering heart disease and cancer;
- boosting the productivity of our workers; and even
- providing an adequate supply of water to the West.

In all these areas, it is vital that Members of Congress have an adequate understanding of the hazards and potential of technology, if we are to grapple effectively with the problems. Members, of course, cannot possibly be familiar with all the latest scientific advances and their implications for public policy—thus, the need for OTA. Over the last few years in particular, OTA has compiled an impressive record of accomplishment. It has produced a virtual library of authoritative, relevant, and viable studies of some of the most perplexing problems that the Government has had to face.

It is perhaps worth recalling how difficult an assignment was given to this new agency. OTA was to be a part of Congress, overseen by a congressional board and servicing congressional committees; yet it was also to be nonpartisan, objective, and technically expert enough to command the respect of the professional scientific community. OTA'S expertise was to cover the entire span of the physical, biological, and social sciences. It was not simply to analyze complex scientific and technological issues confronting Congress—a difficult enough task. OTA was to help Congress anticipate issues that were not yet on the legislative agenda. It was to assess the full range of implications of technological change—economic, technical, social, environmental, political, military, health, etc.—as appropriate. It was to do all this in a manner that would fit congressional timetables and committee jurisdictions. This is a very tall order, indeed. What is remarkable is the extent to which OTA is now fulfilling its mandate.

I look forward to working with Chairman Ted Stevens in building on this record of accomplishment in the year ahead.

TAAC CHAIRMAN'S STATEMENT- CHARLES N. KIMBALL

A major function of OTA is the transfer of technical knowledge from the scientific community to Congress. This is a vital and complex task. No person, even with advanced technical training, can hope to keep abreast of the significant advances in science and technology which have implications for public policy. If Congress is to continue to fulfill its responsibilities to lead this Nation, it must have accurate access to the issues presented by scientific and technological change.

OTA performs this role and performs it well. In addition to its own competent staff it draws on experts in the corporate, university, and public sector communities through project advisory panels, workshops, consultants, reviewers, and contractors. The result is a uniquely comprehensive network of expertise available to help Congress deal with issues as complex and different as, for example, nuclear waste disposal or the international competitiveness of the U.S. electronics industry.

Such technology also flows the other way. OTA reports have become highly valued in the private sector for their authority and utility. Issues that are of concern to Congress are also of wide interest outside the Federal Government. The extensive sale through the Government Printing Office and commercial reprinting of OTA reports is but one indicator of how valuable this agency has become both to Congress and to society as a whole.

DIRECTOR'S STATEMENT-JOHN H. GIBBONS

Some Highlights of 1981

The range of services to Congress provided by OTA during 1981 reflects its broad charter to provide Congress with analyses of the implications—direct and indirect—of science and technology for current legislative issues as well as long-term national problems. A few highlights are given in the following paragraphs. A more complete accounting of OTA'S products and services is provided later in this report.

OTA was asked to provide Congress with an assessment of options for MX Missile Basing. A wide variety of basing schemes was identified and systematically compared to disclose the several advantages and disadvantages associated with each. Projections were made of both the Soviet threat and foreseeable improvements in U.S. technology for the time period when MX would be operational. The resulting comparison showed that all available basing options have one or more serious drawbacks. This work was widely used in the legislative and executive branches during the year and promises to have continuing value.

OTA also provided Congress with a comprehensive analysis of Impacts Applied Genetics. This rapidly moving field promises to be a major source of technological advances in the 1980's in such diverse areas as health, agriculture, chemicals production, and waste management. OTA concluded that current self-imposed safety regulations by researchers and producers seem appropriate; that the current U.S. lead in applied genetics technologies is threatened by vigorous foreign competition; and that new institutional arrangements, especially between universities and industry, are going to be important to the successful application of these new technologies. In contrast to the MX study, OTA'S assessment on genetics was mostly oriented toward foresight rather than current legislative issues. The Government Printing Office reported particularly high sales of this report. It has also been published by the commercial U.S. press and was a featured selection in the recent offerings of the Library of Science book club. The report has also been published in England and now is being translated and printed in Japan by a commercial publisher.

Legislative issues are proliferating with respect to the direct and indirect roles of Government in innovation and international competitiveness. In 1981, OTA completed several studies relevant to these issues. For example, a comparison of international competitiveness in the steel, auto, and electronics industries found that a "macro-industrial" Federal policy would have a number of advantages over the present collection of ad hoc and sometimes contradictory, industrial policies (U.S. Industrial Competitiveness: A Comparison of Steel, Electronics, and Automobiles, July 1981). An OTA analysis of

coal exports and implications for U.S. port development highlighted the major opportunities to expand U.S. coal exports, the capabilities and problems of present deep water ports, and impacts of user-based fees as partial means of financing port development (Coal Ports and Port Development, April 1981),

- Energy issues remain a matter of major concern. During the year, OTA published an assessment of the prospects for Solar Power Satellites; an analysis of alternative schemes for Nuclear Powerplant Standardization; and a definitive study of Technology and Soviet Energy Availability. Several major points emerge from these and earlier OTA energy projects. First, even though demand for oil and gas is rising more slowly than it was (due both to price increases and recession) the difficulty of providing incremental gains in output—or even holding onto current production rates—is increasing, and the margin between current U.S. demand and relatively secure supply is still far from comfortable. Second, sharply higher prices have not resulted in a significantly expanded supply of these premium fuels. In contrast, response to price increases has been remarkably elastic on the demand side as various technologies are used to provide for more efficient use of energy. Third, several promising options exist to obtain more assured safety and performance in nuclear power reactors by means of standardization. One proposed alternative, electricity from orbiting solar power satellites, appears to be unacceptably expensive even under optimistic assumptions. Lastly, while the U.S.S.R. faces level or declining oil production beginning in the latter half of the 1980's, their natural gas production can offset this effect, leaving them with continuing capability to supply domestic needs and to export energy (e.g., gas to western Europe) for badly needed hard currency.
- OTA'S first report on the microelectronic revolution was completed in 1981. Computer-Based National Information Systems: Technology and Public Policy Issues, an overview study, analyzes potential societal benefits and impacts of the new information systems made possible by advances in computer and communication technology. The growing role of information processing in U.S. society, particularly in the economy, is examined. The report explores a number of potential policy issues that Congress may need to deal with over the next decade—among them innovation and productivity, privacy, system security, vulnerability, and Federal use.
- Issues of health and safety have also been highly visible over the past year. The 1981 OTA Assessment of Technologies for Determining Cancer Risks From the Environment describes and analyzes cancer rates and trends, factors that are associated with cancer occurrence, methods to detect and identify carcinogenic substances, and procedures for estimating levels of human risk from such substances. It also examines the Federal laws that provide for regula-

tions to reduce cancer risks. The report resulted in requests for testimony about subjects as varied as health risks from toxic dumps, replacements for animal tests as methods to identify carcinogens, and possible changes in food safety laws. Further, OTA'S discussion of risk assessment is now being incorporated into a National Academy of Sciences study about suggested changes in the process used by the Federal Government to assess risk.

- OTA, as required by Public Law 98-151, must approve the protocol for a Veterans Administration study of possible long-term health effects resulting from exposure to Agent Orange in Vietnam. A draft protocol for the VA study, in September 1981, was found by OTA to be lacking in detail. The VA has returned the draft protocol to the contractor that developed it and asked for a revision.
- Additional aspects of health that continue to be of prominent congressional policy concern are the cost of health care and the relationship between the benefits of specific medical technologies and their costs. Several of OTA'S health studies are directly related to these concerns. Fifteen case studies of the costs and benefits of specific medical interventions were issued during 1981, covering such technologies as automated chemistry analyzers, neonatal intensive care, screening for colon cancer and cervical cancer, nurse practitioners, cimetidine, and gastrointestinal endoscopy. These case studies were prepared as part of a larger project on the feasibility and implications of using cost-effectiveness and cost-benefit analysis in health care. A separate study of the Cost-Ej'ectiveness Analysis of Inactivated Influenza Vaccine, completed during the year, examined the effects on life expectancy and the decreases in illness and in health care costs that might result from increased numbers of vaccinations.

Now Challenges for OTA

During the coming decade, the United States will face problems whose solution will require the power of human inventiveness, nurtured by an economic system that encourages innovation and productive risk-taking. The opportunities for science and technology to improve the national economy, defense, health, and environment are many. The benefits do not come without costs. OTA'S job is to help Congress understand the extent of the opportunities and the potential costs and evaluate alternative approaches to reduce the risks and undesired effects.

In past years, when inflation was lower and public investment for research and development was more readily available, the Nation could often afford to follow many promising paths simultaneously. Now, with mounting pressures to cut Government expenditures, more difficult choices have to be made, including not funding some admittedly very promising ideas. This new imperative means that careful analysis of options is more important than ever because the potential

cost of being even a “little wrong” can be so high. Facts must be sorted out, informed consensus must be sought, and accurate, timely, unbiased information must be available to Congress on a growing list of complex, costly, and controversial issues. OTA carries out these tasks, acting as a shared resource for committees of the House and Senate. In performing its analytical work for Congress, OTA links and synthesizes the collective expertise from all sectors of the United States. Each year roughly 2,000 people from universities, private corporations, State and local government, and Federal agencies assist OTA in its assessment work. In this manner, OTA avoids duplication of existing work and acts as a catalyst to bring national wisdom to bear on congressional issues.

In 1981, OTA worked on more than 30 assessments that, because of their scope and depth, typically require 1 to 2 years to complete. Work on the formal reports was accompanied by interim analytical papers and briefings, delivery of testimony in congressional hearings based on current and past assessments, and technical memoranda. Numerous discussions were held with senior analysts and policymakers, including officials from other nations who sought out OTA for advice and counsel. An internal review was made of the methods of assessment and analysis being used not only at OTA but in other institutions, including private industry.

A Glimpse, Ahead

Satchel Paige once expressed his philosophy of life as “. . . Don't look back; something might be gaining on you . . . !” Despite that admonition, we feel that it is essential both to look backward and forward in order to properly understand the present and to prepare for the future. OTA has this dual responsibility. What, then, do we see ahead?

A year ago I wrote of molecular biology and microelectronics as typifying the advanced areas of science and technology which will deeply impact our personal and national life. I wrote of international and global impacts of human activity that constitute our growing interdependence.

It is easy to be pessimistic. Each year the technological capability of nations to do violence grows. Can mankind use its technological ingenuity to lessen the danger of conflict? Many nations are mortgaging their future by virtue of providing goods and services at a rate that is not sustainable over time. What are our options to build a long-term sustainable world economy? In the past, dire outlooks for the future have more often than not been diverted by the exercise of human inventiveness through technology. What new options can technology offer to turn the tide? What are our best options to assure adequate energy and other resources for the United States? How can we best assist other nations in their struggle for economic growth? To what

extent can we provide a high material standard of living while maintaining a high standard of environmental quality? Our hope for future success lies “. . . not in our stars but in ourselves . . .” (apologies to Shakespeare’s Mark Antony)—i.e., in the unfathomed potential of human inventiveness.

Our best hopes for the future, once focused on the seemingly infinite West and on rich natural resources, now lie substantially in the esoteric world of nuclei, atoms, molecules—a microscopic world of crystal lattices, big molecules, and quantum theory. This microrealm is a world that few people are presently privileged to understand even superficially, and yet all are affected deeply by the technologies that emerge from it.

The increasing gulf between accelerating developments of scientific and technological knowledge on the one hand and the level of scientific literacy of our citizens on the other creates a need for dispassionate analysis and information transfer. OTA’S job in this context is to continue to show that complex and controversial issues can be subjected to analysis that is accurate, understandable, and useful to Congress. Such analysis is the necessary foundation on which effective national policy can be built.