
Section I

STATEMENTS BY THE CHAIRMAN AND VICE CHAIRMAN OF THE BOARD AND THE DIRECTOR OF OTA

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Chairman's Statement—Congressman Morris K. Udall

As a charter member of the OTA Board, I take pride in the reputation the agency has built of doing some of the "best work in town."

Last year, OTA demonstrated how deserved that reputation is as it produced a variety of useful work for Congress.

As Chairman of OTA's Congressional Board for the past 2 years, I'm happy to report that OTA's performance measures up to the high standards we have set. The agency merits our continued confidence and support.

I've had the good fortune to have Sen. Ted Stevens of Alaska serve as my Vice Chairman. His contributions have been a real asset to me and to the agency, and I look forward to working with him 2 more years,

We regret that Dr. Frederick C. Robbins resigned the chairmanship of the Technology Assessment Advisory Council to accept the presidency of the National Institute of Medicine, but we are pleased that he will remain an active member of the Council. We are delighted that Dr. Robbins will be succeeded by Dr. Charles N. Kimball, and that Dr. Jerome B. Wiesner will serve as Vice Chairman. Together, they will make an extraordinarily effective team in advising Congress and OTA on the difficult challenges posed by scientific and technological developments.

The Board especially appreciates the fine job that Dr. John H. Gibbons has done in strengthening and streamlining the internal management of the agency and thus enabling it to meet the needs of Congress more efficiently and effectively. The Office could not be in better hands.

OTA accomplished a lot last year. It delivered a total of 27 reports and other studies to various committees of Congress. OTA representatives testified 17 times before 9 different committees

and gave 249 briefings and responses for Members of Congress, committees, and congressional staff. In terms of sheer volume, that is an impressive amount of work for a small agency to produce in a year's time—especially when it was, at the same time, engaged in an additional 33 other major projects.

Last year, OTA produced major and path-breaking assessments on such subjects as the potential for producing energy from oil shale resources and from our "biomass" resources—our trees, crops, and other plant material; and the technological and competitive strength of our steel industry. The value of these and similar assessments to Congress, and to the larger community of those informed and concerned about vital issues, is underscored by the fact that, according to a Government Printing Office (GPO) spokesman, OTA reports are among the bestselling in its category of any Government agency. During the calendar year 1980, GPO had sold over 48,000 copies of OTA reports for gross receipts of one-quarter of a million dollars. The National Technical Information Service of the Department of Commerce also sells individual copies and microfiche of all OTA reports and working papers. The demand is in the thousands with 20 titles on NTIS' bestseller list. In addition, an increasing number of OTA assessments are being reprinted by commercial publishers. By the end of the year, nine were either already in print or were in the process of being reprinted. Section V provides a more detailed listing of these highlights.

In a city overwhelmed by studies and analyses, OTA's work stands out for its integrity, its insight, and its usefulness to Congress.

I am proud to have served as Chairman of the OTA Board during the past 2 years. I look for-

ward with eagerness to working with Ted Stevens and my other colleagues in guiding the

efforts of this important agency for another productive 2 years.

Vice Chairman's Statement—Senator Ted Stevens

As a member of the OTA Board since 1973, and as its Vice Chairman during the last Congress, I believe that 1980 must rank as the most productive and certainly the most satisfying year in the agency's young life.

The best evidence that our joint efforts have succeeded over the past year—is the fact that the committees keep coming back for more. While the volume of congressional requests for OTA studies and services increased, OTA demonstrated an ability to handle this increased volume, despite the fact that the size of its small staff remained the same.

As Chairman during the last Congress, Congressman Udall of Arizona guided the work of the

Board with a deft hand. I know I speak for all on the Board when I say it was a pleasure to serve with him.

I look forward to working with other Members of the Board in helping OTA forge even more productive relationships with the committees of Congress. Science and technology will play an important role in maintaining the strength of the Nation's economy and national defense in the years ahead. Congress faces issues requiring the kind of expert, objective, and cross-cutting analysis that OTA performs while reflecting the perspectives of the private sector. Together, we can continue to build on OTA's already excellent record of meeting congressional needs for honest and unbiased advice.

Director's Statement—John H. Gibbons

OTA continued, in 1980, to work on some of the toughest and most important issues before Congress.

For example, one of the last bills Congress sent to the President in 1980 makes pneumococcal vaccine an acceptable medicare expense. Before that, medicare funds could be used for the more expensive and less effective task of treating pneumonia after it happened, but not for preventing it. OTA did some key analysis on this issue, showing that the vaccine was clearly cost effective.

In a similar vein, OTA did several comprehensive analyses on energy supply and availability. The work on liquids from shale showed both the promise and the problems of achieving significant shale oil production over the next 8 to 12 years. It also highlighted the inefficiencies inherent in either very modest or very ambitious production goals for 1990. Our work on oil shale also disclosed barriers to production which would limit plausible production by 1990 to a maximum of 1 million barrels of oil per day with severe regional

impacts above 300,000 barrels per day. Our analysis of the energy potential of biomass underscored the major importance of producing methyl alcohol from nonfoodstuffs—which far outweighs the potential for production of ethanol from grains and sugars.

Our studies of the U.S. and foreign steel industry pointed out the opportunities provided by advanced, proven technologies such as continuous casting; the need for major capital investment in new, more productive facilities; and the need for higher levels of R&D spending to enable the industry to benefit from innovative technologies.

These are a few examples of the wide range of work we produced last year. Because much of that work centers around the comprehensive analysis of controversial issues, our studies typically require more than a year to complete. Thus, much of OTA's formal agenda of work for 1981 is already set, generally reflecting bipartisan requests from various congressional committees. On top of these formal assessments, which re-



Photo credit Office of Technology Assessment

Congressman Udall chairing a joint meeting of the Congressional Board and the Technology Assessment Advisory Council

quire staff expertise, the use of external contractors, and the advice of distinguished panels of private citizens, OTA provides a wide variety of assistance to committees, using information derived both from past and current assessment projects.

OTA's Congressional Board and the Technology Assessment Advisory Council provided key leadership and guidance throughout the year. The Board helped OTA's management make difficult choices between competing needs for OTA's resources. It gave wise counsel in such areas as choice of work, division of attention between long-term and near-term issues, and on ways to improve the transfer of technical information to Congress. The Advisory Council reviewed the Office's program of work and supplied important insights concerning its quality and comprehensiveness, as well as helping identify emerging issues that will likely be subjects for future OTA assessments.

As technology becomes increasingly important in maintaining a vigorous economy, OTA's unique capabilities to provide a variety of analytical services will be especially helpful to the 97th Congress. The OTA staff will continue to count on the leadership of the Technology Assessment Board, the advice of the Technology Assessment

Advisory Council, and the generous devotion of time and wisdom of the scores of advisors, consultants, and contractors from the private sector. It is this remarkably broad involvement of people that is a hallmark of OTA.

Emerging Issues of the 1980's

OTA always tries to be as responsive as possible to the interests and priorities expressed by committees. At the same time, OTA is constantly made aware, from a wide variety of contacts, of emerging issues in science and technology. The following is a brief profile of a few issue areas in technology that we believe will be of increasing concern to Congress.

- Areas where science and technology are changing rapidly. Fruits of scientific research provide a richer understanding of our world and also serve as a main source for social progress through an advancing economy. Three examples illustrate this point:

1. Molecular engineering. —The present and prospective rate of advance in molecular biology research is phenomenal and is exceeded only by the diverse and powerful implications it holds for society. Areas in

which applications will probably be significant in this decade include production of complex biochemical needed to treat human disorders and diseases, development of improved food material, and creation of specialized enzymes and microbes to upgrade organic materials and digest toxic wastes. Perhaps the most important application of this new knowledge about how life works will be to improve the treatment of human illness.

2. **Microelectronics.** —A steady advance in research in another “micro world”—of surfaces, solids, semiconductors, and super-miniature electronic circuits—promises continued technological developments that will have an impact on our national security and in virtually every sector of our economy. The same advances in the physics and chemistry of solid and liquid surfaces that will allow more effective computers and telecommunication devices will also lead to more effective ways to convert sunlight to storable, high-grade energy. Implications for society will be profound as “smart” electronics both create and displace jobs and create new patterns of social communication.
3. **Energy.** —Driven by higher oil prices and projected scarcities of current energy sources, research in both new energy sources (e. g., fusion) and in ways to use energy more productively (fuel substitution and conservation) is accelerating. The future will probably be characterized by higher costs of resources and uncertainty of supply. This implies continuing congressional interest, especially when market signals do not adequately reflect either marginal (replacement) costs of energy or nonmarket costs such as those associated with our dependence on imports.

• Situations where there are major socioeconomic impacts from existing technologies or where important opportunities exist for using technology to meet national needs. Toxic and hazardous wastes are current examples. These unwanted residuals from the processing and use of resources will not go away through protracted arguments and adversary proceedings. How-

ever, a variety of technologies strategies exist that can be employed to: 1) clean up old hazardous waste storage sites that pose a threat to health and the environment; 2) improve the way that presently generated wastes are handled; and 3) reduce waste in streams by process modifications that produce the same product, or other modifications that lead to somewhat different products that perform the same tasks.

A second major set of examples concerns international security. Threats to security derive from diverse origins such as shifts in comparative military capabilities of various nations and coalitions (especially NATO, the Warsaw Pact, and the PRC); short-term and protracted vulnerability of U.S. access to world oil supplies; and the erosion of U.S. competitiveness in international trade. In each instance, improved scientific and technological capabilities must play a critical role in improving American security.

• Long-term trends related to science and technology. One important responsibility of OTA is to provide foresight about the longer-term future, especially as it might be shaped by current policy, evolving technology, and underlying forces such as demographic change and resource depletion.

1. Much is known about the profound but sharply different demographic changes faced domestically and in less industrialized countries. But little thought has been given to the kinds of impacts the various demographic patterns will have on technological innovation or on demand for technological development.
2. The rapid advances in computers and telecommunications provide manifold opportunities to improve human productivity, use resources more efficiently, and provide new amenities. Substantially more comprehensive thinking about the broad social and economic implications of these new technologies (e. g., on employment) appears justified.
3. We are beginning to recognize some “dis-economies of scale,” e.g., with respect to powerplants. Major technological opportunities exist to allow efficient economic operations on a smaller or decentralized

scale. At the same time we must not lose sight of the tremendous contribution that economy of scale can make. The challenge is to find the optimum scale for each technological application in the face of changing prices of resources.

4. There is increasing concern that human activity is beginning to stress the capacity of the Earth to supply resources and absorb wastes. It is extremely important that we improve our understanding of the extent to which these concerns are justified. To the extent that they are, it is vital that we identify and assess the various courses of action that can ameliorate the situation. Advanced science and technology will be central to this effort.

Resolving the Issues of the 1980's

As science and technology provide greater capability both to provide amenities and to wage war; as human population increases and migrates; as extraction of mineral and energy resources leads inexorably to dependence on lower grade or less accessible resources; and as collective human activity increasingly affects the whole environment of our planet, we must respond with greater wisdom. Human ingenuity seems to be the one resource whose limits are not measured and certainly not fully engaged. This ingenuity becomes manifest in several ways, including science, technology, and institutional innovation.

Q Ingenuity expressed in science gives us understanding about the opportunities—and the limits—provided through natural law.

- Ingenuity expressed through technology provides us with diverse ways to achieve our many wants and needs. There are many ways in which technological ingenuity can provide amenities with more efficient use of increasingly scarce resources.
- Ingenuity expressed through institutions provides us opportunities to bring our accumulated learning and collective wisdom to bear on our needs and problems. New cooperative arrangements throughout our society and especially between the public and private sectors are needed to take full advantage of technology. New approaches to social, economic, and technological conflict resolution beyond adversary processes need to be devised.

How do we build a future that will offer to all our citizens the high standard of living and level of amenities that many already enjoy and that others aspire to, when that future will inevitably contain more people, more expensive resources, and less margin for error? How do we make this future sustainable, when many of our habits and ways of doing things were developed during an era of low population and inexpensive, seemingly inexhaustible resources? To what extent can technology help us make the transition to a more demanding and less forgiving future? Can an economy be devised which, like the mature ecosystem, is highly competitive and innovative while still in some form of overall equilibrium?

These are some of the difficult and searching questions that will confront Congress in the years ahead. Clearly, technology assessment has a major role to play in helping Congress explore them.