Section III
WORK IN PROGRESS

OTA's work is structured along three broad divisional lines: energy, materials, and international security; health and life sciences; and science, information, and natural resources. Within those broad divisions, OTA conducts studies in energy, international security and commerce, materials, food and renewable resources, health, human resources, communication and information technologies, oceans and environment, and space technology.

More than 60 projects were in progress during the year, including 14 new studies.

In this section, the broad concerns and current work schedule of each OTA program are described for 1981 and beyond.

Section III
WORK IN PROGRESS

Energy, Materials, and International Security Division

Energy

Several factors combined in 1980 to give the Nation a respite from the series of energy shocks which began in 1973. Conservation driven by higher prices, higher than normal winter temperatures, and the economic slowdown have reduced total energy use in the United States by nearly 4 percent from 1979. In particular, the higher oil prices have so reduced the Nation's oil consumption that it is currently importing about 30 percent less oil than in the peak year of 1978. In addition, domestic energy production, led by coal, is continuing the slow increase that began 4 years ago. Congressional activity on energy matters in 1980 was considerably below the 1979 level due partially to these circumstances. The principal effort was completion of the Energy Security Act which established the Synthetic Fuels Corp., greatly expanded biomass programs, and set up new conservation and solar finance programs.

Despite the apparent easing of the Nation's energy problems, considerable danger remains for the next decade. The United States is still critically dependent on imported oil, and the threat of future cutoffs continues. Although conservation has been substantial—beyond the expectations of the most optimistic forecasts of a few years ago—it is still not clear how much is a short-term cutback and how much is a long-term gain in efficiency. Domestic production is increasing but currently not fast enough to offset the expected declines in older oilfields in the years ahead. Thus, Congress will face a number of important issues in the coming years and activity is likely to increase dramatically in 1981.

OTA should continue to be an important resource for Congress in analyzing energy issues. OTA assisted Congress in the course of its work on the Energy Security Act. In particular, OTA's analysis of energy from biological processes was important in developing those portions of the bill concerning wood and alcohol fuels. In addition, the OTA study on the Department of Energy's (DOE's) Conservation and Solar Energy programs proved useful to congressional authorizing committees in treating that part of DOE's program. OTA also released an updated summary of the coal slurry pipeline study which was used extensively during the House debate on slurry pipeline legislation. Finally, OTA, by drawing on completed and ongoing studies, was able to help Congress meet immediate needs through testimony and other short-term responses on topics such as wood energy, methanol fuels, cogeneration, conservation in buildings, and enhanced oil recovery.

Currently, the Energy Program is working on a number of studies which should be of interest to the upcoming Congress. These include studies nearing completion on nuclear powerplant standardization and the solar power satellites. The former should contribute to the anticipated congressional debate on the future of nuclear power. Other studies include: dispersed electric energy systems, which will deal primarily with cogeneration; energy and city buildings, which addresses conservation in buildings and the particular energy problems facing cities; synthetic fuels for transportation, which is focused on the role of synfuels and increased automobile efficiency in meeting the Nation's liquid fuel needs; and industrial energy use. Finally, OTA will begin a study on technologies that could ease the effects created by an oil supply disruption or chronically tight oil markets. There will probably be strong congressional interest in contingency planning for possible long-term oil shortages and this study should contribute to that debate.

Alternative Energy Futures

Following an analysis of major issues involved in alternative energy futures, a number of separate but related studies have been initiated. Work on the future potential of "liquefied natural gas

imports" has been completed. The second study is "energy for city buildings, " which will focus on the interaction of technology and policy for new and existing buildings in U.S. cities for the next two decades. The massive current stock of buildings contains a high proportion of structures, both residential and commercial, constructed in a period of low energy cost when the continuing cost of energy use received no attention. Improving the energy efficiency of these structures is important in terms of energy policy, city viability, and the interests of individual owners and tenants.

This study will analyze retrofit technologies, both to conserve energy and to employ renewable energy that can improve the energy efficiency of structures. Capital costs, energy savings, and factors such as reliability and maintenance will be identified. Second, the study will explore the types of building owners. Regional factors affecting city opportunities and constraints, choices of action open to Federal, State, and city governments, and the related impacts of various policy choices will be examined.

A third major effort for the alternative energy futures study, Industrial Energy Conservation, has recently been initiated. This project is designed to examine a series of four American industries (pulp and paper, steel, petroleum refining, and organic chemical production) for their potential to use energy more efficiently, and to predict the impact of selected legislative options on energy use and efficiency within those industries.

OTA will examine the available technologies designed to improve energy efficiency, as well as the barriers to such technology's implementation. The legislative options to be examined range from tax policy changes such as accelerated depreciation, to institutional changes in capital financing methods. Each option's effects will be evaluated through a series of case studies in which corporation executives, consultants, and computer-modeling techniques are used to forecast the impacts of possible congressional action. Option's will also be examined at the industry, industrial sector, and national energy use and economic levels using a similar series of modeling, management, and consultant evaluations.

The Energy Policy Forum will retain the broad scope of the original Alternative Energy Futures assessment, but will limit analysis to a systematic inventory of the most critical areas of agreement and disagreement over both factual assumptions and social values relating to energy use. This document will be used internally to guide related studies, and in 1981 to choose the remaining work necessary to complete *Alternatiue Energy Futures* study.

Delivery date: Early 1982. Call 226-2152 for further information.

Requesters House Committees: Banking. Finance, and Urban Affairs; Interstate and Foreign Commerce; Select Committee on Population.

Dispersed Electric Energy Generation Systems

The possibility of using cogeneration and solar energy in all its direct and indirect forms, and the rapidly escalating economic and environmental costs of large energy facilities have stimulated considerable interest in small, dispersed energy systems. In particular, problems faced by the electric utility industry, such as rapidly rising capital costs, long leadtimes for plant construction, and difficulty in finding suitable sites, make dispersed energy systems attractive. It is essential, however, to determine the benefits and costs of dispersed systems in setting effective policy. This study will examine the role that cogeneration and small energy conversion equipment could play in meeting the country's need for electric energy. It will review the economic, environmental, social, and institutional consequences of dispersed electric systems and their effect on the electric utility industry. Finally, it will analyze policy options Congress may wish to consider in addressing the issues about the development of such systems.

The study will examine the technical features of dispersed systems using a variety of dispersed cogeneration and small electric-generating equipment. It will then analyze the economic and technical effects of such systems on utilities using models developed for the OTA onsite solar study. Concurrently, evaluation of changes in utility structure would be carried out using decision models similar to those used by utilities.

Finally, a series about the effects on society (e.g., employment, risks, etc.) from dispersed systems would be examined. This would include public perception of small-scale, onsite energy facilities.

Delivery date. Spring 1981. Call 226-2152 for further information

Requester House Committee on Banking, Finance, and Urban Affairs.

Nuclear Powerplant Standardization

No new orders for nuclear plants are likely to be placed for the next several years, but new electric generating capacity will be needed soon. One of the greatest obstacles nuclear plants must overcome if they are to contribute to this new capacity is a lack of public confidence in reactor safety. Furthermore, there is probably general agreement among both proponents and opponents of nuclear power that the present licensing process is not an efficient means of ensuring either safety or economically viable reactors. Standardization of nuclear powerplants has been proposed to improve both safety and licensability. The potential benefits of standardization are clear and some progress has been made, but several issues have to be addressed before the concept can be implemented. For instance, the time needed to prepare and improve standard designs, the degree of standardization to be required, the number of designs to have available, and the period for which they should be valid will all affect the feasibility and desirability of standardization.

This study will examine many of the technical and institutional issues about nuclear powerplant standardization to determine its current status, whether it can enhance safety, and the extent to which standardization is possible.

Delivery date Early 1981 Call 226-2152 for further information.

Requester. House Committee on Interior and Insular Af - fairs

Solar Power Satellite Systems

This project will respond to congressional interest in a limited but independent assessment of the potential advantages, shortcomings, and impacts of solar power satellite systems. It is intended to aid in deliberations concerning the appropriate level of Federal commitment to future development of this technology. It also will provide an improved background against which to evaluate analytical results and program proposals arising out of a study by DOE and the National Aeronautics and Space Administration completed in August 1980.

Major topic areas, within which key uncertainties will be addressed in a balanced treatment of positive and negative impacts, include: 1) future markets and the need for power from solar satellites, 2) cost feasibility of alternative satellite systems, 3) environmental impacts, 4) social and institutional factors, and 5) competing energy technologies and approaches. Within these categories, material resource limitations, health effects of microwave radiation, implications of highly centralized electric generation systems, and the expanded role of the Federal Government in energy production that may be required. Strengths, weaknesses, and uncertainties associated with the solar satellite concept will be contrasted with those of other long-term energy sources such as nuclear fusion.

The study is designed to identify and analyze the key issues that need resolution before decisions whether or not to develop major solar power satellite systems can be made. The study is divided into four parts: alternative satellite concepts, public acceptance (including environmental concerns), institutional acceptance (including utility integration and international concerns), and programmatic context (competing long-term energy sources, e.g., fusion, land-based solar). In each, a background paper will be prepared summarizing the problems and alternatives. A workshop will then be held for each of the areas to identify and describe the major issues, highlighting the divergent views. The background papers will form the basis of the workshops. On completion of the workshops, a report will be prepared by the OTA staff with the key issues and their analysis along with a summary of the background material. This report will provide assistance to Congress in evaluating major studies now underway or being initiated to determine the feasibility of these systems.

Deliuery date Early 1981 Call 226-2152 for further information.

Requester House Committee on Science and Technology

Synthetic *Fuels for Transportation*

Synthetic Fuels for Transportation is a project in the Energy Program to assess various synthetic fuels that can be used for transportation and automotive technology that can increase passenger car fuel efficiency beyond 1985 standards, and to compare these two options. The issue is how best to balance these approaches, as the synthetic fuel program develops and efficiency increases are contemplated, to achieve the most effective and economic path to reduced dependency on imported oil.

The Energy Program will review the technical, economic, environmental, and social features of the major synthetic fuels and automotive technology (increased automobile fuel efficiency and electric vehicles) including information from reports by the Congressional Research Service, the Congressional Budget Office, and OTA studies on oil shale and biomass. In addition, potential oil savings through increased efficiency and fuel-switching in stationary uses of oil will be briefly described. Synthetic fuels and increased automobile fuel efficiency will then be compared using a variety of criteria, including consumer and investment cost, time frame for deployment, environmental impacts, and macroeconomic impacts. Selected issues related to these subjects will be discussed and policy options developed.

Delivery date: Summer 1981 Call 226-2152 for further information

Requester Senate Committee on Commerce, Science, and Transportation.

International Security and Commerce

The interdependence of world nations is becoming increasingly evident. A wide range of vital U.S. national goals can be achieved only with the cooperation of other nations, or by deterring them from acting in ways that threaten the Nation. U.S. national security requires both economic and military strength, and U.S. technology continues to be an indispensable ingredient in both. Technology must continue to be a distinctive U.S. asset in the future, and must be used wisely. The International Security and Commerce Program assists Congress when setting an appropriate national policy requiring a sophisticated understanding of the status and implications of key technologies.

As military forces grow more and more expensive, the United States relies on a relatively small number of military systems, each of which embodies a variety of advanced technologies. In 1980, OTA initiated a project to study the ways in which the MX intercontinental ballistic missile (ICBM) could be based. During the course of 1981, Congress will be informed about the advantages, costs, and technical uncertainties of the alternative proposals for deploying this new missile.

In connection with international trade, the Program continued during 1980 a major assessment of the international competitiveness of the U.S. electronics industry. This industry is a particularly useful subject for study because it includes areas of substantial U.S. technological leads (e.g. advanced semiconductors) and areas in which the United States has failed to retain markets in international competition (e. g., color television sets). We drew upon this ongoing study as well as on completed OTA work on other industries to assemble a comparative study of U.S. international competitiveness in the steel, automobile, and electronics industries. This study highlighted ways in which technology, governmental policies, and other factors affect U.S. industrial competitiveness.

The Program's final major study in 1981 will point out the ways in which international commerce and the traditional definitions of national security interact. This is a study of the impact which transfers of U.S. (and other Western) technology in energy production to the Soviet Union could affect Soviet energy supplies in the next 10 years, and how the level of Soviet energy supplies might affect U.S. national interests. This project will examine and compare the state of technology in the Soviet Union, the United States, and other Western countries: it also will examine the difficulties which the Soviets might

have in paying for Western technology and in absorbing it effectively; and finally it will examine the controversy over future Soviet energy production levels and the role Soviet production plays in world energy markets. These studies will assist in advising Congress about the likely consequences of alternative U.S. export policies.

Competitiveness of U.S. Electronics industry

There is growing concern that U.S. industries are losing, or have already lost, their position of international technical leadership and that this in turn adversely affects their position in world markets. OTA is examining this problem by studying industries chosen to illustrate a spectrum of issues and industry capabilities. The electronics industry is particularly appropriate because it is sensitive to a volatile and rapidly advancing technology and because it occupies a strategic position in the light of its contributions to innovation in other industries. The OTA assessment will look at three sectors of this industry: consumer electronics (where the United States has suffered heavily from Japanese competition), semiconductors (where a strong U.S. position is under challenge), and computers (where the United States still appears to lead the world).

The assessment focuses on those major contributors to the competitiveness of the electronics industry that could most readily be affected by U.S. Government policy. In each case, a comparison is made between the United States, Japan, and (to a lesser extent) Western Europe. The major factors are: 1) commercialization of research, development, and design: 2) manufacturing techniques and resources; 3) finance, including both private and public sources of funds; 4) human resources; and 5) overall governmental industrial policies.

Delivery date: Summer 1981. Call 226-2020 for further information.
Requester Senate Committee on Commerce, Science, and Transportation

MX Missile Basing

The Soviet Union may now be in the process of acquiring, through increases in the accuracy of its new generation of MIRVed missiles (SS0 17's, 18's and 19's), the capability of destroying our land-based ICBMs in their silos. The Department of Defense expects this Soviet capability to become substantial in the early 1980's. In response, the administration has proposed to deploy a new missile, the MX, in a series of multiple protective structure groupings in the southwestern desert. Proponents claim that the missile location uncertainty thus introduced will protect these missiles from Soviet attack. Opponents object to the system on many grounds, including cost, technical feasibility, environmental impact, and an escalation in the arms race.

OTA's objectives are to assess the technical feasibility, strategic utility, cost, impact on the region, and future consequences of various MPS basing modes, and of any alternative missile basing modes that merit serious attention.

OTA is examining the latest administration MPS proposal, important generic classes of MPS systems, and various alternative basing concepts. Each will be investigated for technical feasibility (including technical risk, survivability, and the availability of resources), utility in the context of a variety of generic future scenarios (peacetime deterrence, arms control negotiation, severe crisis, and war) cost, in the broadest sense (both dollars spent and impact on the region where MX is based), and possible future consequences (including Soviet responses, and U.S. counter responses).

Delivery date: Summer 1981 Call 226-2020 for further information.
Requester Chairman and Vice Chairman of OTA's Congressional Board,

U.S. Industrial Competitiveness: A Comparison of Steel, Electronics, and Automobiles

OTA's study of technology and the steel industry was recently published; a parallel study on the international competitiveness of the U.S. electronics industry is in process. The efforts have now been extended in the study of industrial competitiveness to a cross-industry comparison. This comparative project draws on OTA's work in steel and electronics, supplements it with a

brief examination of the U.S. automobile industry, and discusses the implications of these three case studies for U.S. policies toward industry.

The three industry sectors differ with respect to a wide range of factors which influence competitiveness —e. g., export orientation; level, nature, and maturity of technology; and frequency of innovation. These differences permit comparative analysis of the three industries, including the effects of Government policies on their competitive strengths.

The project includes a comparative economic analysis of the three sectors, drawing on the existing OTA work. "the analysis will include evaluations of the competitiveness of each industry, as indicated—e .g., by parameters such as import penetration, productivity, and return on assets. Based on the work discussed above, Government policies towards the three industries will be examined, with particular attention to the ways in which they might vary from industry to industry.

Delivery date: Early 1981. Call 226-2020 for further information.
Requester: Senate Committee on Commerce, Science, and Transportation

Technology and Soviet Energy Availability

There is general agreement that the oil industry in the U.S.S.R. is facing serious difficulties. It is increasingly clear that the extent of Soviet energy problems and the way in which the Soviets deal with them can have a major impact on U.S. interests–i. e., in the effects of Soviet entry into world oil markets, the repercussions on the political and economic stability of Eastern Europe; and the increased chances of Soviet adventurism in the Persian Gulf. The U. S.S.R.'S problems result from the depletion of its older fields, which obliges it to look offshore or to remote areas of Siberia for proven reserves or promising sites for new discoveries. The harshness and/or accessibility of these areas, together with the lack of adequate technology, infrastructure, and trained manpower, will slow down their development during this decade. Similarly, the continued exploitation of more accessible fields is hindered by technological lags in Soviet drilling and enhanced recovery techniques and equipment. Whether the United States can or should assist Soviet oil production through the export of technology is a matter of debate; substantial disagreement also exists over the degree to which exports of American oil equipment and know-how to the U.S.S.R. might expand production, and over the impact of existing or potential U.S. trade policies on Soviet energy policies. The objective of this study is to illuminate these uncertainties by investigating the role that American technology might play in Soviet energy development.

The study addresses the following questions:

- What equipment and technology are needed by the Soviet Union for development of its energy resources?
- What factors inhibit or enhance the efficient use of imported energy technology in the U. S. S. R.?
- To what extent is the United States the sole or preferred supplier of energy technologies likely to be sought by the U. S. S. R.?
- Who are potential suppliers of comparable technologies and what are the costs and benefits of resort to them by the U. S. S. R.?

Based on the answers to these questions, OTA will construct several cases which assume various levels of availability of U.S. and other Western energy technology. These will be examined in terms of impact of such availability on Soviet energy production to 1990. The range of energy supply estimates will be used in turn to discuss the policy options available to the Soviets vis-a-vis other Warsaw Pact countries, the Western importers of Soviet energy, and the Middle East.

Delivery date: Summer 1981. Call 226-2020 for further information.
Requesters: Senate Committee on Banking, Housing, and Urban Affairs. House Committee on Foreign Affairs.

Materials

The industrial base of a modern technological society requires a vast array of raw materials of many different types. The importance of materials to our society is suggested by the fact that annual consumption of minerals in the United States is about 40,000 lb per person. Society uses materials through what is called the materials cycle. The cycle starts with extraction of minerals or harvesting of renewable resources such as wood, proceeds through processing and end-product manufacture to use of the product by the consumer, followed by disposal of the product, and in some cases, reuse or remanufacturing of the product or recycling of the material.

At every stage of this cycle, the ways in which materials are handled are affected in complex and interlocking ways by institutional, economic, environmental, and technical factors. For example, the exploration, development, and production of a significant fraction of our minerals and timber are governed by the Federal land management laws and regulations; the degree to which materials are recycled after use depends partly on the relative costs of virgin and recycled materials and these costs partly depend, in turn, on institutional and technical factors; environmental concerns are leading to more stringent and costly controls on operations at all stages of the materials cycle from extraction through waste disposal; and new technology has simultaneously opened up hitherto untouched areas for exploration, development, and production, and helped to mitigate at least some of the associated impacts on the environment.

The Program has one ongoing project related to extraction (Federal coal leasing) and one ongoing project related to processing and manufacturing (nonnuclear hazardous waste management). The new projects started in 1981 will probably be concerned with the efficient management and use of materials resources, including renewable materials resources.

Development and Production Potential of Federal Coal Leases

The Federal coal leasing assessment, mandated under the Federal Coal Leasing Amendments Act (Public Law 94-377), involves an independent analysis of all outstanding Federal coal leases, which include 564 developed and undeveloped leases and 172 preference-right lease applications. The study analyzes all mining activities on Federal leases, assesses the present and potential value (development potential) of the outstanding coal leases, estimates revenues to the Federal Government, and examines the feasibility of using deep-mining technology in leased areas. The assessment addresses issues of interest to the Senate Committee on the Interior and its subcommittee on Mines and Mining in evaluating the need for new leasing and the role of coal in the Nation's energy future.

Delivery date Spring 1981. Call 226-2210 for further information.
Requester Mandated by Public Law 94-377,

Nonnuclear Industrial Hazardous Waste

Many nonnuclear industrial hazardous wastes must be stored or disposed of with great care or they may constitute a threat to health and the environment. Information on the nature and magnitude of the hazardous waste disposal and abandoned site problem will be reviewed. The reliability and efficacy of present containment, abatement, and disposal measures will be assessed. This information, coupled with criteria and techniques to judge relative health and environmental hazards of a given waste, will assist in identifying those wastes which could be reduced at the source—by modifications in process technologies, by recycle, or by an end-use substitution. Approaches for reducing hazardous waste generation with minimal undesirable economic effects on domestic industry will be identified.

This assessment has four objectives: 1) to assess criteria for defining hazardous waste and for judging the relative health and environmental hazards of a given waste; 2) to evaluate technologies for cleaning up present waste disposal sites that are hazardous to health and the environment; 3) to assess technologies and approaches for the safe storage or disposal of hazardous waste being presently generated; and 4) to assess technologies and approaches for reducing the volume of hazardous waste. The possible economic impacts on domestic industry of various approaches will be evaluated.

The project will focus initially on understanding the adverse consequences of present disposal strategies and techniques, and next on ways of reducing generation of industrial hazardous wastes economically. Alternative options will be developed to cope with hazardous waste disposal in the short-run and hazardous waste generation in the long-run.

Delivery date Summer 1982 Call 226-221O for further information

Requester House Committee on Energy and Commerce

Health and Life Sciences Division

Food and Renewable Resources

The disappearance of abundant, cheap energy, the accelerating rise in world population, and industrial and economic development have all combined to put increasing pressure on the world's—and the Nation's —food and other renewable resources. In their scale and intensity, these pressures have rendered obsolete the traditional and largely compartmentalized views of agriculture, forestry, wildlands, and water management. Increasing and competing demands for these resources threaten to undermine their very capacity for self-renewal. The world's ability to make available to an expanding population a nutritionally adequate supply of food is exceedingly uncertain.

The Food and Renewable Resources Program explores, in its assessments and studies, the effects of technology on the productivity and sustainability of all elements of food and fiber production, distribution, and marketing; all ecosystems (agricultural lands, forestlands, wetlands, rangelands, deserts, etc.), their inhabitants, and their service functions; and human health as it is affected by food quantity and quality.

In today's world of 4 billion people, perhaps as many as 10 percent are suffering from malnutrition and, in some cases, starvation. As the global population rises to a projected 6 billion by 2000, world food demands will rise and the world will continue to look to the United States for assistance. How can technology contribute to the solution of food problems?

Economic and environmental pressures in the United States are changing the natural resource base. The United States is rapidly losing some of its best soils to erosion and salinization. Competing uses strain the water resource and affect its availability and quality. What are the new technologies that can help sustain the land's natural productivity and maintain water quality?

To provide Congress with information on these and related problems, the Program identifies current and emerging technological issues that affect the United States and world food and renewable resources situation as well as issues affecting the sustainability of the renewable natural resource base.

Future food studies will deal with aspects of food and agricultural systems and of diet-health relationships.

Future renewable resource studies will fall within the following categories: land and soils, forests and other vegetation, ground and surface water, wildlands and wildlife. The studies may focus on aspects of or relationships between these resource systems and on ways of manufacturing, restoring, or improving them through the wise application of technology.

Impact of Technology on Productivity of the Land

Were it not for technological advances, world agriculture would never have been able to keep pace with world population growth. Historically, U.S. technology has had a pronounced positive impact on increasing the productivity of croplands and pastures. U.S. dependence on a continuing supply of renewable natural resources compels it to maintain the stability of the ecological systems from which the resources arise. Now, however, there is increasing documented evidence showing that human activities are straining parts of the biological and physical systems and that the land's productivity is in jeopardy.

The land productivity assessment is examining the effect of presently used technologies on the capacity of the cropland and rangeland resource base to sustain high levels of production, and on emerging technologies that might be used to offset adverse effects of some of the established technologies. The assessment includes evaluations of: 1) The adequacy of available data on the effect of technologies on land productivity, and 2) new technologies that have potential for restoring, maintaining, or improving the productivity of the cropland and rangeland resource base. Selected case studies are being developed to indicate how society is affected directly and indirectly where long-term productivity of agricultural ecosystems is being altered through innovative applications of technologies.

Delivery date Summer 1981 Call 226-2264 for further in - formation

Requesters Senate Committees. environment and Public Works: Appropriations House Committee on Agriculture

U.S. **Food and Agricultural Research**

The success of U.S. food and agriculture industries has been based on an ever-increasing use of new technologies. However, the effectiveness of these technologies and/or their development seems to be decreasing at a time when the research problem base is expanding and the intensity of some problems is increasing.

This assessment will examine the scientific base for establishing national, regional, and local research problems; identify the role of the Federal, State, and private research institutions in solving these problems; evaluate cooperative methods in identifying priority research areas; update evaluations of the adequacy of present basic and applied research efforts; and evaluate public policy options for Congress.

Delivery date: Summer 1981. Call 226-2264 for further information.

Requesters: Senate Committees: Appropriations, Agriculture, Nutrition, and Forestry.

Innovative *Biological Technologies for Developing Countries*

This study reviews innovative biological technologies that might be used by the Agency for International Development (AID) to assist developing countries enhance the fertility of their tropical/subtropical soils and improve food production while reducing the need for costly commercial fertilizers. OTA conducted a workshop on this topic attended by 45 people in November 1980. The workshop included scientists from universities and executive branch agencies, congressional staff, and AID agricultural specialists. The final report will summarize 10 papers on innovative biological technologies and evaluations of the technologies, and present a summary of how these technologies might be used by AID.

Delivery date Spring 1981. Call 2262264 for further information

Requester House Committee on Foreign Affairs

Health

The value American people place on health is reflected in the large number of Federal policies on health. Many of these policies address issues of health-related technology, directly and indirectly, while a great many others indirectly affeet the development and use of such technology. As a result, the Federal Government has become deeply involved in every aspect of the

process of development and diffusion of medical technologies —supporting R&D, evaluating safety and efficacy, and encouraging the use of beneficial technologies, while discouraging the use of unsafe or obsolescent technologies.

The Health Program assists Congress by: 1) examining the Federal role in anticipating and managing domestic and international impacts of health-related technology; 2) identifying and highlighting the social, political, economic, and ethical concerns surrounding the development and use of medical technologies; and 3) assessing the consequences of Federal policies involving the provision of and payment for particular medical technologies.

The work of the Health Program up to now has focused on methods of evaluating clinical medical technologies, and evaluation of computers in health care. However, although health may be viewed as being determined by four factors (genetics, personal behavior, environment, and health care), those two areas relate almost exclusively to only one of the four—health care. The field of genetics is the responsibility of another OTA program, but little work has been done by OTA in the other two areas. Because of this, in 1978 it was decided to initiate studies concerning health and the physical environment. The first study is examining cancer and the environment. In addition, the Health Program is working with other programs on aspects of their assessments where health effects may be an important factor. For example, the Program has taken some responsibility for developing information being carried out by the Materials Program.

Cost-Effectiveness Analysis of *Inactivated* Influenza Vaccine

This assessment examines the costs and health effects of vaccination against influenza. Data regarding several aspects of influenza, including hospitalization, physician visits, work loss, school loss, and disability from fiscal years 1970 through 1978 are analyzed through the use of a cost-effectiveness analysis model.

All costs and health effects are converted into ratios (e.g., cost/year of healthy life saved), which are used to compare the cost effectiveness of influenza vaccination for selected age groups. A sensitivity analysis is used to test the significance of certain variables, such as vaccine efficacy. Potential implications of Federal reimbursement for influenza vaccination are discussed.

Delivery date: Technical Memorandum, Early 1981 Call 226-2270 for further information.

Requester: House Committee on Interstate and Foreign Commerce.

Technologies for Determining Cancer *Risks From the Environment*

Reducing exposure to carcinogenic agents in the environment depends on identifying the causative agents, assessing the agent's potency, locating sites of exposure, and deciding on appropriate interventions. In addition, regulations to reduce exposure must be politically, socially, and economically acceptable. In this assessment, OTA examines four major issues:

1. Estimates of the percent of cancer due to environmental exposure. Of particular interest are the quality of the data used to make the estimates, how the data can be improved, and what effect different estimates might have on cancer policies.
2. Technologies used to test for carcinogenicity. Testing of chemicals in rats and mice has been the mainstay of carcinogenicity testing. Those tests, the rapidly developing "short-term" tests, and epidemiologic methods for determining carcinogenicity are discussed and compared.
3. Methods used for extrapolating data from animals to humans. Different methods of extrapolation lead to widely divergent estimates of human risk. The limited number of efforts made to compare carcinogenicity in animals and humans are described.
4. Regulatory pathways for controlling carcinogens. The application and utility of available data implicating agents as carcinogens vary under different health laws and pol-

icies. The various approaches to regulating these agents are examined.

Also presented as part of the assessment are options for improving information gathering, processing, and decisionmaking.

Delivery date Spring 1981 Call 226-2070 for further information
Requester OTA Director, with approval of the OTA Congressal Board

Evaluation of *Veterans Administration Agent* Orange *Protocol*

The epidemiologic study by the Veterans Administration of the long-term health effects resulting from exposure to agent orange was mandated in the "Veterans Health Act of 1979, " Public Law 96-151. The same law requires OTA to review the study design. An advisory panel will be assembled to assist in the review.

Delivery date Indeterminate Call 226-2070" for further information.
Requester Mandated by Public Law 96-151.

Strategies for Medical *Technology Assessment*

Technology assessment is gaining increasing acceptance as a means of rationalizing health care. This trend has been stimulated by the rapidly rising costs of health care and technology's contribution to those costs. Since assessments can be expensive and time-consuming and can result in delaying the diffusion of beneficial technologies, and since not all technological developments can be systematically assessed, it is critical to select: 1) the right technologies to be assessed, 2) the optimum stage of technological development, and 3) the appropriate assessment methods. It is also important for the information gained from assessments to be disseminated in a timely and efficient manner. Currently, there is no coherent Federal policy regarding the selection process, and there are major problems with information dissemination. These issues are critical because many Federal agencies, as well as private organizations and individuals, depend on information from assessments to make decisions.

This study examines the appropriateness and validity of existing assessment methods, such as controlled clinical trials, epidemiological studies, consensus exercises, and computer models, with the intent of identifying alternative strategies for assessment. In addition, the MEDLARS information and retrieval system of the National Library of Medicine is evaluated with respect to the appropriateness of indexing, storage, and retrieval of useful information. The uses of that information by both governmental and private sectors are then examined in relation to the safe, efficacious, and efficient use of medical technologies.

Delivery date. Late 1981 Call 226-207(1 for further information
Requester. House Committee on Interstate and Foreign Commerce

Technology and *the Handicapped*

Approximately 45 million Americans–including 10 million children—have significant mental or physical handicaps. Technologies for aiding handicapped people are numerous, varied, and often complex and expensive. Such technologies are designed to alleviate. eliminate, or prevent the effects of handicapping conditions. They can be used to provide mobility and independence, restore or improve functional abilities, and help enable handicapped individuals to lead more productive and fulfilling lives.

The Federal Government's involvement in this area is extensive. A multitude of programs and agencies develop, evaluate, provide, pay for, and deliver technologies. Other actions—such as civil rights and education opportunity laws—provide conditions and incentives for further development of and investment in technologies for the handicapped.

Yet there are serious questions about whether technologies for the handicapped are being developed and used in as effective and efficient a manner as possible. Inadequate information exists regarding the overall process of technological development and use. Individual aspects of the technological process also remain troublesome. For example, what is the appropriate role for sophisticated technologies as opposed to (or in con-

cert with) the soft areas such as human service delivery systems that ultimately may determine the effectiveness of technologies? What methods exist for assessing the costs and benefits to society or to handicapped individuals of investment in or use of various technologies? What is the state of knowledge in regard to such costs and benefits? What effect will advances in medical technology have on the number and types of handicaps?

This assessment will provide information on general issues, such as the state of the art of evaluating efficacy, safety, and costs. In addition it will address definitional problems and their implications. Most critically, it will examine several theme issues in depth. For example, what are the causes and the effects of today's emphasis on sophisticated technology?

Delivery date Earlv 1982 Call 226-2070" for further Infer mation
Requester Senate Committee on I.abor and Human Resources

Human Resources

The Human Resources Program explores technologies which directly affect human beings and their quality of life other than those which fall more appropriately into the Health or Food Programs. Examples are technologies affecting education, labor and population or deriving from genetics or other biological sciences.

Current assessments are in two areas: genetics and population. Interest in genetics arises from greatly expanded understanding of, and emerging capability for, altering or affecting the inherited characteristics of man, animals, and plants. The term "genetics" is used broadly and includes related biological technologies such as in vitro fertilization and artificial insemination. The importance of these emerging technologies is illustrated by the concern of the scientific community and the public over research with recombinant DNA, which led to development of the National Institutes of Health guidelines, the increasing use of procedures to detect genetic defects, and the recent successful human in vitro fertilization.

Rapidly growing population is a major factor influencing the quality of life everywhere. World population did not reach 2 billion until 1930, but only 45 more years were required to double it. Such rapid growth has placed great stress on the Earth and its resources as well as on economic and political stability, especially in those developing countries where population growth rates are highest. Increasing recognition of the importance of the rights of individuals to have children and to choose their number and spacing is illustrated by rising support for family-planning programs over the last 25 years. Prior to 1965 only a few Third World countries had developed such policies.

These assessments are of unusual interest because many of the issues they raise are rooted in individual and societal values, attitudes and beliefs.

Technology and World Population

World population has passed 4.4 billion and is expected to double in 70 years. Growth of this magnitude has major implications for the global biosphere and for international economic and political stability. Because of the serious consequences of rapid population growth—such as increasing demands for food, energy and jobs—most governments and international agencies have adopted policies and initiated programs in the last 20 years to modify birth rates.

OTA's study of global population examines how government policies and programs view planned birth technologies, and how new international population assistance has changed world population growth in the last 20 years. It projects probable impacts of population growth from 1980 to 2000 on food, energy, jobs, income, and other aspects of quality of life; and it assesses present and prospective planned birth technologies and factors determining their future development and use. The assessment focuses

on the Third World, where 92 percent of population growth in the next two decades will occur and where their governments seek to slow growth, It includes a research agenda relevant to their problems and presents policy alternatives open to the United States in dealing with world population issues. U.S. domestic population policies are not included in this assessment.

Delivery *date* Spring 1981 Call 226 2090 for further information
Requester The OTA Director, with the approval of the OTA Congressional Board

Impacts of *Applied Genetics*

"Applied genetics" refers to those technologies that can influence biological characteristics inherited by living organisms, Recent advances in knowledge are leading to greatly expanded capability to affect genetic characteristics and to use these techniques to improve the quality of life. Both industry and government in the United States and abroad are increasing their efforts to harness the gene for production of fuels, chemicals, and medicinal products. This assessment identifies and analyzes the impacts of nonhuman applications of genetic technologies. Animal, plant, commercial, and industrial applications are described. The costs and benefits. legal considerations, and social and ethical concerns associated with genetic technologies are identified and, where applicable, compared to those associated with nongenetic approaches. The potential of genetics in developing biological approaches to ensuring a sustainable future through renewab!e resources is considered. The study presents policy options with regard to such topics as the patentability of life forms, Government-industry relations in developing genetic technologies. and germplasm rnaintenancc.

delivery *date* Early 1981 Call 226- 2090" for further information
Requester *The* OTA Director, with the approval of the OTA Congressional Board

Science, Information, and Natural Resources Division

Communication and Information Technologies

Telecommunication and information systems technologies are rapidly advancing and becoming more integrated New facilities are being established, and new enterprises are merging in the United States and abroad. Governments are taking interest in the social and institutional implications of the new' technologies Government - tal and industrial reorganizations are occurring, new legislation is being proposed and adopted, and relevant international norms are being formulated in global and regional forums.

Because of the unprecedented growth in the new telecommunication systems investment. and the expanding impacts on society of emerging national information systems, several committees of Congress consider it essential to assess the developing technologies and their broad societal impacts. General policies affecting areas as such as innovation", education. use and management of radio frequency spectrum are also in a state of rapid change. The Communication and lnforma tion Technologies Program includes several projects, One, on national information systems. and another, on telecommunication systems, are be - ing conducted on a coordinated basis

The Parent System and New *Technological Enterprises*

The climate for generating new technologically based enterprises in the United States has worsened during the past decade Economists differ in their appraisals of the exact contribution such firms make to innovation, employment, and economic progress: however-. it is possible that the contribution level is high and that technologically based enterprises are essential to the growth and revitalization of our society. Fledgling entrepreneurs and independent innovators are frequently dependent on, and influenced by, the patent systcm to a much greater degree than are large, established firms. In almost all aspects of the patent system - e g , proscution, inter-

ferences, licensing, litigation–small firms and individual inventors face far more difficult obstacles and economic choices than do the large firms. The importance of new technologically based firms to the future economic vitality of the United States underscores the need to assess the impact of the patent system on the generation and stimulation of such enterprises.

Delivery date Spring 1982 Call 226-2249 for further information

Requesters House Committee on the Judiciary Senate Committee on the Judiciary.

Information Technology and Education

Over the last decade, the educational system has been increasingly pressed to meet a variety of new needs on a constant or even shrinking budget. The Federal and State governments now require that schools provide equal educational opportunities to groups traditionally outside the mainstream, such as the handicapped. Changing needs for job skills and changing demographic conditions also present new demands for education and training beyond the ages traditionally considered as the educational years. Information technology potentially provides opportunities for education systems to improve productivity and quality of instruction, and to offer more flexibility both in content, and in the time and place of offering. Previous attempts to enlist technology in education have had mixed outcomes, but the markedly lower cost and increased capability of new and projected computer technology, coupled with advances in telecommunication services, imply the need for a new look at educational use of technologies. The study will identify and project relevant technology and R&D activity and the providers and users of curricula, educational technology; and assess the likely impacts of selected alternative policies on the use of information technology.

Delivery *date:* Summer 1982. Call 226-2249 for further information.

Requester House Committee on Education and Labor.

Societal Impact of National Information Systems (NIS)

The NIS project comprises four interrelated information system studies, selected in response to several expressed Committee interests and grouped to ensure more efficient management and reduce cost. The National Crime Information Center (NCIC) of the Federal Bureau of Investigation and related State use of computerized criminal histories are being studied. OTA is examining operational aspects, access to and use of data, principal user categories, data quality in the system, State uses of and attitudes toward NCIC, and alternative managerial and technical futures. Future electronic message systems are being studied with emphasis on the U.S. Postal Service's role in such systems and implications of alternative national policies. Electronic funds transfer is studied with a view toward identifying likely growth rates in these services and the implications for society of alternative national policies in this area. An overall assessment of the broader implications of computer-based national information systems was nearing completion at year-end and will serve as an umbrella tying together the information systems studies in particular sectors.

De/iuery date Summer 1981 Call 226-2249 for further information

Requesters Senate Committee on the Judiciary House Committees: Judiciary, Post Office and Civil Service

Societal Impact *of Telecommunications Technology*

This study reviews the telecommunication technology base and industry structure and identifies major participants in the domestic common carrier telecommunication sector, their roles and interactions. A variety of future policy frameworks are being developed, including one that assumes no major change in the extant legislative base. The implications of these alternative policy frameworks are examined on the basis of a com-

mon set of key issues, and the projected implications will be set forth as far and as clearly as possible. Common issues being examined include aspects of rates, economics, and accounting; implications of regulation: competition and industry oversight: industry and market structures; role of the Bell system: the use of resources and impacts on R&D: and implications for using and affected publics.

Delivery date Spring 1981 Call 226-2249 for further information.
Requester Senate Committee~ On Commerce, Science. and Transportation

Impacts of the 1979 World Administrative Radio Conference

More than 150 nations' representatives met in Geneva, Switzerland, for 11 weeks in late 1979 to review and adjust the global allocation of uses of the radio magnetic spectrum. This major world meeting changed frequency allocations, adopted new definitions, planned additional future world and regional conferences, and modified the International Radio Regulations of the International Telecommunication Union (ITU). This study will review the U.S. preparations for and participation in that conference, identify its major results and project their impacts, and look at the future role of ITU and the U.S. participation in ITU and such future conferences.

Delivery date Fall 1981 Call 22(> -2249 for further inforrna tion
Requester Senate Committee on Commerce, Science. and Transporation

Oceans and Environment

Recent years have brought an increased awareness of the impact of the oceans on the well-being of humankind—the oceans' potential as a source of food, fuel, and hard minerals; their use as avenues of world commerce and communications; and their role in man's search for knowledge about his resources and environment. At the same time, we are beginning to understand that, although the oceans are vast, they are not inviolate to the interventions of man. Much more needs to be understood about the effects of such occurrences as oilspills, overfishing. the discharge of toxic substances and the role of the oceans in atmospheric carbon dioxide concentrations.

The United States, with a heavy marine interest, predicates its policies on facts derived from comprehensive ocean research. This effort is becoming increasingly more expensive as demands become more extensive. As a result, the job of Congress in determining the most effective allocation of Federal resources, both financial and institutional, has become more difficult and more critical.

To assist Congress in its deliberations. the Oceans and Environment Program focuses on a broad range of issues encompassing the uses and quality of the oceans and the systems deployed on or in the oceans or along their shores. The Program is particularly concerned with examining possible future uses of the oceans.

Fresh water Resources Management, Planning and Policy: An Assessment of Models and Predictive Methods

The effective management and protection of our freshwater is of far-reaching importance to the future of the Nation. Serious problems currently confronting the United States include inadequate surface water supply, ground water, hazardous drinking water, and erosion of our most productive soils into rivers and streams. As the Nation's water problems become more complex, the often

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conflicting advice presented to Congress by Federal agencies, advocacy groups, and expert witnesses is increasingly difficult to evaluate. Often this advice is based on the results of computer models and predictive methods of unknown quality or effectiveness. The information provided by these techniques becomes the basis for deciding such congressional water resource policy decisions as funding water supply structures. pollution control programs, and initiating the use of such new technologies as desalination. OTA's study of the tools that help supply this information will clarify which proposals are based on the best available analysis procedures and the assumptions and limitations of these tools. The assessment will consider a wider range of models and predictive methods, advising Congress of the credibility of the techniques used to predict the work of water resource projects and regulations, and the societal ennvironmental effects of these decisions.

Delivery date: Spring 1981. Call 226-2046 for futher information.
Requester: House Committee on Interior and insular Affairs

High-Level Radioactive Waste Management and Disposal

More than three decades into the nuclear age, this country still has no permanent disposal facilities for either military or commercial high-level radioactive waste. This assessment focuses on technologies for disposal of commercial high-level waste (spent fuel or solidified waste from processing). A clear understanding of the problem of managing radioactive waste from its generation to final disposal requires comprehensive analysis of the interactive relationships among possible storage and disposal technologies, transportation systems, regulatory considerations. and Federal, State, and local jurisdictional prerogatives. The OTA study is using a systems analysis technique to evaluate a range of strategies for developing and deploying a commercial high-level radioactive waste disposal system. Other waste forms are considered to the extent needed to deter-mine how their management and disposal will affect commercial high-level waste disposal plans and to provide a basis for analysis for the impacts of, and management problems presented by, a full-scale waste disposal system.

Delivery date Summer *1981* Call 226-2046 for further Information
Requesters House Committee on Merchant Marine and Fisheries Supported by House Committees Scienc~ and Technology. Foreign Affairs Senate Committee on Energy and Natural Resources

Impacts of Atmospheric Alterations

Many present day human activities—particularly the burning of fossil fuels—are altering the Earth's atmosphere in potentially harmful ways, The precise nature and extent of such activities is unclear. However, the potential consequences are severe enough to merit careful congressional consideration of domestic and international Federal policies.

Some of the consequences, such as acid rain, are occurring today. Others. such as global climate changes due to increasing carbon dioxide concentration, may appear within the next century. Increasing sulfur and nitrogen oxides and their transformation products (acid rains and oxidants) may damage thousands of lakes, decrease crop and forest productivity, deplete soil nutrients. and damage buildings and monuments. Increasing atmospheric carbon dioxide concentrations and other climate modifiers might result in global climate changes severe enough to disrupt present agricultural patterns and raise the sea level enough to flood major urban coastal areas throughout the world. Increasing sulfur and nitrogen oxides and certain climate modifiers may have adverse effects on human health.

The OTA study will develop a range of plausible impact scenarios covering the next several decades, describing the potential social, economic and environmental consequences of atmospheric changes caused by human activities. These scenarios will not attempt to "forecast" the future, but instead, present a range of plausible consequences of these changes, in terms responsive to near-term congressional decisions,

Delivery date Spring 1982 Call 226-2046 for further information
Requester HOUSe Committee on Interstate and Foreign Commerce

Ocean Research Technology

Federal ocean research efforts amount to about $1 billion per year and involve the operation of ships, satellites, buoys, aircraft, submersibles. and other- advanced technology. Our capabilities have increased in recent years. This has resulted in steady. repeatable data collection and survey work in several important areas. But such re se arc h work needs to be done with other ocean-related activities and phenonmena—in particular, weather and climate, marine pollution, undersea mineral exploration, and fisheries (especially krill). This assessment identifies the technologies and management systems that are most effective in researching these four areas. OTA will describe the options available for technology development as well as for getting the most out of existing equipment and management systems,

Delivery date Early 1981 Call 226 2406 for information
Requester. Senate Committee on Commerce, Science, and Transportation

Space Technology

The completion of the Apollo Program, the launchings of Landsat 1. the Synchronous Meteorological Satellite. and Applications Technology Satellite 6, and the arrival of the Viking spacecraft at Mars represented the culmination of U, S. civil space technology developments of the 1960's and early 1970's These activities were marked by international dissemination of American space "know-how" and the birth of commercializecl space systems, initially in communications. Since that time, advance in U, S, space technology capabilities have been slowecl by markedly reduced funding, except for- the Space Shuttle.

Many Federal. State, and local agencies use or are experimenting with uses of space-acquired data to support their missions. Private businesses in satellite communications have capital facilities valued at over $1 billion, based on the established space technologies. and private interest in commercializing new space ventures is growing. The United States faces competition from several other nations with declared space goals and funded. competitive technic-a] capabilities. The Space Shuttle is approaching operational capacity. but at present it serves only a limited orbital regime Controversy exists over the readiness of certain technologies to become operational, and the institutional arrangements, policies and procedures. if any. appropriate to their commercialization. Because the relatively straightforward things have largely been done. the next major advances in space technologies are likely to be more cost a n d to take longer Such advances are highly risky and long-term: they are widely seen as requiring government funding

Congressional committees have expressed concern about national policies for [J. S. civil space activities in the light of these conflicting developments. OTA has been asked to assess the U.S. civil space activities: the economic, social legal, and political impacts of the technologies and possible policy options dealing with the conflicts and issues suggested by the developments above,

The present study in this Program deals with overall issues and policy options and focuses on space applications. Topics such as science and exploration, the role of humans in space and their activities, and space transportation systems remain to be treated in depth.

Space Policy and Applications

The assessment explores the adequacy of the Nation's present and future civilian space technology base. It examines the possible reliance on that base for applications of space technology in the 1980-2000 time frame The focus will be on current and anticipated uses and management of remote sensing, communication satellites. materials processing in space. and the utilization of the space transportation system. A range of program and policy options will be developed, together with their societal, institutional, and economic implications. International impacts and cooperation and the U, S. space technology-based competitive position~ will also be considered. The

study has cross-cutting ties to the ongoing OTA assessments of solar power satellites, land productivity, and telecommunications, each with important space technology facets.

Delivery date: Summer 1981. Call 226-2209 for further information.
Requester: Senate Committee on Commerce, Science, and Transportation.

Transportation

Of major concern to Congress is the ability of the transportation system in the United States to provide fast, efficient, and inexpensive mobility for people and goods. Transportation industries have had to contend with increasing economic, operational, environ mental, and safety problems in recent years. In addition, there are a number of factors, growing In importance, which may force a change in transportation technology and policies in order to modify the system and the manner in which it is operated. These include:

- the almost complete dependence of the transportation system on petroleum in an era where dependence on imports must be reduced, and where supplies are dependent on the political stability of the Middle East;
- the rising percentage of the overall system cost represented by the cost of petroleum fuel;
- the physical deterioration of roadbeds and equipment at a more rapid rate than that of investment in their replacement; and
- the increasing cost of operating transportation systems--both public and private, freight and passenger-because productivity has not kept pace with demand for transportation services.

Since transportation supplies society with mobility for people and the wide range of goods and services needed, a degradation in the transportation system could significantly affect the character and lifestyle of society in the future.

In 1981, congressional interest will probably continue to focus on the influence of the cost and availability of petroleum and its effect on transportation systems, the deterioration of roadbeds and equipment, and the inability of the existing system (based on yesterday's technology) to meet the economic, environmental, and social needs of the future.

The Program will center its efforts on the effects of technological development in the areas of:

- goods movement technology—rail and truck systems—to improve service and reduce costs;
- urban transportation technology —evaluation of alternatives to the automobile to reduce petroleum consumption, emissions, and congestion;
- air transportation technology—to cope with changes in the system due to deregulation and increased costs of operation;
- reduction of the dependence on petroleum through the development of electrical propulsion and energy distribution systems.

Advanced Air Transportation Technology

This assessment examines the impact of introducing or not introducing advanced high-speed aircraft into our future commercial fleet and of other potential commercial aircraft developments. The assessment is being conducted in four parts: 1) advanced high-speed aircraft (completed), which examines the economic, energy, environmental, and societal impacts of introducing advanced subsonic and/or supersonic aircraft into the future commercial fleet; 2) program management and financing alternatives of advanced high-speed aircraft, which examines alternative structures for financing and managing new aircraft programs, specifically an advanced supersonic transport; 3) low-density air service which studies its historical evolution, the economics of low-density service and the determinants of market size, conditions of competition, future evolution of the domestic commuter airline industry and the impact of deregulation; and 4) air cargo operations, which includes the historical background and current status of the airfreight industry, economics of airfreight and

the potential market, competitive concerns, and the potential for technological change in future cargo aircraft, including lighter-than-air systems.

Delivery date Part 1, published April 1980, Parts 24. spring 1981 Call 226 2249 for further information
Requesters House Committee on Sciencce and Technology

Airport and Air Traffic Control System

Safety, performance in terms of capacity and delay, and productivity are vital concerns of our air transportation system, Increased traffic around many of our major and medium hubs, brought on partly through the Airline Deregulation Act of 1978, is contributing to safety, congestion, and delay problems. The cost of delay is becoming much more significant due to the increased cost of fuel, Also, public pressure against both noise and further expansion or development of airports is constraining possible solutions to these problems. However, there are a number of alternatives both technological and operational, which may help reduce or alleviate these problems. This is particularly true with regard to airport airside capacity. For example, in the next decade, proposed plans call for substantial investments to implement new technologies for air traffic control such as microwave landing, collision avoidance, navigation. communications, surveillance and higher levels of automation of the traffic control function. Other alternatives propose more efficient use of existing airports. development or improvement of reliever airports, more efficient ground transportation systems, and separation of traffic for various user groups as a means to improve airport airside capacity. In light of changing air transportation operational patterns, new aircraft technologies, and rapidly changing telecommunications and information systems technologies, this assessment will look at the process of growth of the commercial and general aviation sectors and examine the relative merits of alternatives to satisfy the air travel demand of the 1980 to 2010 time frame.

Delivery date Summer 1981 Call 226 2249 for further information
Requesters House Committee on Appropriations

Other Projects

Technology *for Local Development*

Technological innovations now being developed —such as land disposal of wastewater, distributed residential energy systems, and housing rehabilitation techniques—provide an alternative and possibly more effective approach to community and regional development. These technologies stress self-help and the use of renewable resources and are compatible with local capital and environmental requirements. This project assesses several prototype technologies, the local problems they may alleviate, and their feasibility and potential impacts, It examines options for Congress to build institutional structures that accrue the maximum benefits of these technologies to urban and rural communities,

Delivery date Early 1981 Call 226-2249 for further information
Requesters Senate Committee on Governmental Affairs
House Committees Select Committee on Population, Interior and Insular Affairs

Technological Innovation and Health, Safety, and Environmental Regulations

This assessment evaluates alternative regulatory policies with regard to their effectiveness and efficiency in ensuring that the rate and direction of technological change are compatible both with health. safety, and environmental goals and with the goal of maintaining economic vitality. The study includes an examination of how regulatory policies, when integrated with technical market and financial considerations at the corporate level. influence private investments in innovation,

Delivery date Summer 1981. Call 226-2060 for further information.
Requester Senate Committee on Commerce. Science. and Transportation