Assessments in Progress

Assessments in Progress (Continued)

Assessments in Progress

ENERGY, MATERIALS, AND GLOBAL SECURITY

ENERGY

Alternative Energy Futures

During 1978, considerable congressional interest was expressed in a comprehensive study of the Nation's energy future. In this study, OTA is providing a comprehensive picture of supply and demand patterns for energy in the future and their effects on society, the economy, and the environment. OTA is also analyzing various transition paths from our present dependence on dwindling fossil fuels to a system fueled by renewable energy sources. In addition, the study is providing the basis for responsible formulation of public policy by identifying and analyzing the critical issues that must be resolved for such policy. Specifically, OTA is examining various energy futures scenarios and their impacts. These include three possible levels of energy demand, and conditions such as intensive electrification, high use of synthetic fuels, energy self-sufficiency, or high solar use. The study is establishing the requirements needed to meet energy demand for each of the various scenarios in a general way and then determining the energy efficiencies and resources needed to meet those demand structures. Also, the economic, environmental, and social effects, as well as the technical requirements of meeting each demand structure, are being analyzed.

Within the framework of the Alternative Energy Futures study, OTA is assessing the economic as well as the international issues involved in importing LNG (liquefied natural gas). The study is exploring such issues as availability, costs, potential markets for LNG and the consequences of Government actions, including incremental pricing, standards for price and other contractual arrangements with supplying countries, and indirect incentives.

Home Energy Use—Conservation Issues

Before the 1973 oil embargo and the last two unusually severe winters, little attention was paid to future energy shortages. Since then, several Federal programs and regulatory initiatives have been designed to reduce residential energy consumption and increase the efficiency of home energy use. In this assessment, OTA is studying the trends of energy use in residential buildings, the role of energy prices in encouraging conservation, and the opportunities for promoting energy savings in Federal housing programs. The effectiveness of Federal, State, and local conservation programs as well as the status of research and development in energy conservation and opportunities for technological advances are also being examined. In addition, the study will identify impacts of reducing residential energy use.

The Direct Use of Coal

Coal is expected to be the foundation of the Nation's energy future because it is the only domestic fuel whose use can be greatly expanded. However,

the impacts of the anticipated growth in coal use are, in many respects, uncertain. In this study, OTA is seeking a broad understanding of how coal is used, what role it could play in the future, and what impacts will result. OTA is also examining how coal production can be increased, and the impacts of an increase; and how negative impacts can be reduced and the effects that would have on production. Specifically, the study is examining such issues as: (1) present and future mining, combustion and air pollution control technologies; (2) labor issues such as miner health and safety, and labor-management relations; (3) factors affecting coal production and use (availability, regulations, environmental and transportation restrictions); (4) environmental impacts of combustion (air, water, and land); and (5) present Federal policy towards coal.

Solar *Power Satellites*

Considerable interest has been shown in the feasibility of obtaining solar energy by using satellites to convert solar radiation to microwaves and beam them to Earth for conversion to electricity. In this assessment, OTA is identifying issues that need clarification and resolution. These issues include the cost of constructing these satellites, their reliability, the affects of microwave beams on life forms and the ionosphere, the institutional arrangements between the utilities and the Government, the potential vulnerability of satellites to hostile actions, and the degree to which solar power satellites would lead to increased economic centralization. In addition, OTA is assisting Congress in oversight of programs already underway. OTA is also comparing solar satellite systems with other inexhaustible energy systems.

Energy From Biological Processes

In the search for renewable and non-polluting sources of energy, many experts see a potential for obtaining increasing amounts of energy from plants and plant wastes (commonly called biomass). In this assessment, OTA is analyzing the potential for and impacts of biomass. The study will examine various conversion processes such as direct combustion, pyrolysis, and distillation, analyze policies that could accelerate commercialization, and examine what research and development is still needed. OTA is also exploring the range of biomass fuels—from crop and wood residues to forests and crops grown specifically for energy. In addition, OTA is looking at end uses of biomass-derived fuels or chemicals. Emphasis will be given to the possible uses of liquids and the technical, economic, and systems trade-offs between possible uses.

NATIONAL SECURITY

Effects of Nuclear War

At the request of the Senate Foreign Relations Committee, OTA has undertaken a study of the effects of nuclear war. The study is examining the effects which nuclear attacks of various sizes might have on the civilian population, economies, and societies of the United States and of the Soviet Union, and will in addition discuss the long-term effects of a major nuclear war on

Assessments in Progress (Continued)

areas elsewhere in the world. Because a report was requested within a few months, OTA is pulling together existing knowledge rather than undertaking original research, but the study will be unusual in its effort to examine the entire range of effects—direct and indirect, physical and social, short term and long term—rather than confining itself to consequences which lend themselves to rapid quantitative treatment.

Nuclear war is not a comfortable subject, but the fact that nuclear war is possible lies at the foundation of U.S. national security policies. The OTA study will not pretend to predict what an actual nuclear war would be like, but rather it will give a sense of what kinds of consequences should be expected, and of the nature of the uncertainties which dominate serious consideration of such a war. A careful explanation of the extent of these uncertainties, and the reasons why many of them cannot be resolved, is just as important as a summary of what we do know about the effects of nuclear weapons.

TECHNOLOGY AND WORLD TRADE

Foreign Policy Implications of Global Trends in Energy Supply and Demand

This assessment will examine the linkage between the global trends in energy supply and demand, the impact of major supply and demand technologies on those trends, and the achievement of U.S. foreign policy objectives. It will identify and analyze areas in the world where energy shortages or high prices are likely to create political and economic difficulties during the next three decades, the nature of those difficulties, the impact of these developments on the economic and security interests of the United States, and the policy options and technological innovations available to mitigate negative impacts here and abroad.

Requested by the Senate Committee on Foreign Relations, the assessment is proceeding in three basic stages. The first is a review of existing information concerning present world energy resources, energy demand, and programs to increase supply and moderate demand now under way in key areas throughout the world.

The second stage will comprise a series of credible scenarios regarding the price and availability of depletable energy resources during the next 30 years. These scenarios illustrate, among other things, the potential impact of aggressive energy conservation policies, unexpected discoveries or failures to discover new fossil fuel resources, and possible policy decisions by major petroleum exporting nations.

The third stage will analyze the scenarios to illustrate their impact on the economic welfare of the United States and other nations. The assessment will highlight impacts which could weaken various national economies, seriously threaten the aspirations of developing nations, and jeopardize U.S. security in-

terests. U.S. foreign policy and policy responses, including U.S. foreign assistance in energy technologies, will be analyzed.

Technology Transfer

At the request of the House Committee on International Relations, and the Senate Commerce Committee, OTA has undertaken a project designed to identify the opportunities and obstacles posed by technology transfer, analyze a range of appropriate policy responses, and assess their likely consequences.

The project is divided into three distinct components: technology transfer between the United States and the Communist world; the impact of technology transfer between the United States and the developing countries; and transfer between the United States and other OECD countries.

These studies will examine the current state of U.S. technology, the U.S. role in international trade in technology, technology transfer and its relation to innovation and productivity, the role of technology transfer in the maintenance of national security, and the viability of technology transfer as a political lever or tool of diplomacy. A case study approach will be used.

Because of congressional interest, the study of East-West transfer is being undertaken first. The study will examine techniques for evaluating the impact of Western technology on the economies of Communist countries, and provide a basis for weighing economic costs and benefits along with political and national security interests which will be affected by this trade. The study will evaluate the efficacy of technology transfer as an instrument of foreign policy, and assessing the value of such transfers as a means of improving East-West trade.

The Impact of Technology on Competitiveness of U.S. Industries

A growing number of people have become concerned recently that U.S. industries are losing, or have already lost, their position of technical leadership in critical areas. Further, there is fear that this change will adversely affect their ability to compete in world markets. At the request of several congressional committees, OTA is examining this problem by looking carefully at four important industries: steel, electronics, chemicals, and aircraft. These industries were chosen to illustrate a wide spectrum of issues and industry capabilities. They range from the steel industry, which is a mature, capital-intensive industry where technology changes slowly, to the electronics industry, which is very volatile and critically sensitive to a constantly changing technology.

The steel industry is being examined first because of congressional priorities. OTA is analyzing the role played by technology in the fate of the U.S. steel industry and in steel manufacture around the world. This assessment will examine the kinds of technologies now available worldwide and attempt to anticipate those that may be available during the next few decades.

For the purposes of this study, the steel industry is not being treated as a single entity. Rather, three major elements of the industry are being treated

separately: integrated carbon steelmaking, non-integrated carbon steelmaking (including "mini-mills"), and alloy/specialty companies. Each category presents unique opportunities and problems for study.

The study is examining ways in which research, development, and demonstrations of new steelmaking techniques are now conducted in the United States and by our major competitors. It is also exploring the incentives and barriers to the introduction of new technologies. The impact of a variety of Federal programs and regulations (including labor regulations, environmental controls, and health and safety regulations) are also being explored. A broad range of possible legislative solutions to problems identified will be suggested and their impact assessed.

MATERIALS

Analysis of Laws Governing Access Across Federal Lands for Minerals Development

During 1978, Congress deliberated over the assignment of Federal lands in Alaska to different conservation systems. At issue was how much Federal land would be set aside in parks, wildlife refuges, national forests, and wild and scenic rivers, and how much would be available for development of natural resources.

To lay a basis for congressional consideration of the issues involved, OTA undertook an assessment of the major environmental, land planning, and Federal land management laws applicable to Alaskan lands. The final report is being published for use by the 96th Congress.

Management of Fuel and Nonfuel Minerals on Federal Land

This assessment, requested by OTA Board member Senator Stevens of Alaska, analyzes the Federal land management laws and practices that govern physical access to and exploitation of minerals on Federal onshore land, exclusive of Indian land, and the interaction of the Federal laws and practices with State and local controls and payment requirements. The analysis seeks not only to identify problems, but also to indicate possible approaches to a more efficient and equitable system.

The assessment focuses on the important role Federal onshore land plays in the provision of both mineral and nonmineral resources to the people of the United States. It describes the mineral development process and the role of the various participants in the process, and outlines the history and main elements of the Federal laws governing mineral development on Federal onshore land. Specific issues and options are presented in each of three major areas: (1) the coordination of mineral development activities undertaken by different individuals and firms; (2) the coordination of mineral development activities with nonmineral activities and values; and (3) the coordination of regulatory and payment requirements imposed on mineral development activities by different agencies of the Federal Government and by the different levels of government (Federal, State, and local) in our Federal system.

Assessments in Progress (Continued)

Materials and Energy From Waste

This study examines the potential for, and barriers to, recovering and recycling resources from municipal solid waste. The final report will identify and analyze both the policy options for realizing the potential and the likely impacts of implementing such options. Requested by the Senate Committee on Commerce and the House Committee on Science and Technology, the assessment considers: (1) markets for such recovered goods as paper, aluminum, ferrous metals, glass, and energy; (2) source separation for materials and energy recovery; (3) the economic and technical feasibility of using centralized facilities for recovering resources; (4) economic policies to stimulate the demand for recovered resources; (5) the effect of freight rates on the movement and sale of recovered goods; and (6) mandatory deposits on beverage containers.

Conservation of Metals to Reduce Losses in the Materials Cycle

This assessment examines the materials cycle from mining through product disposal to identify and quantify materials wastes and losses and to suggest techniques for reducing these losses. Various conservation objectives are being defined and the applicability of each conservation approach is being evaluated in terms of those objectives. The final report will evaluate public and private policy options for encouraging conservation as a means for coping with short-term cyclical problems in materials supply and demand which may develop in the future.

Federal Coal Development Rights

OTA has been directed by Congress to conduct an analysis of all outstanding Federal coal development rights, which include over 500 leases and 200 preference-right lease applications in effect in August 1976. This assessment will analyze all mining activities on Federal leases, determine the present and potential value of the outstanding coal development rights, estimate revenues to the Federal Government, and examine the feasibility of using deep mining technology in leased areas.

Oil Shale—A Case Study of Recovery of Minerals From Subeconomic Resources

Rich oil shale deposits, containing approximately 1 trillion barrels of shale oil that could be ultimately recovered, are located within a relatively small area in Colorado, Utah, and Wyoming. However, various technological, environmental, and economic uncertainties associated with oil shale processing must be resolved before shale oil can make a significant contribution to the Nation's energy supply mix. Accordingly, at the request of the Senate Committee on Energy and Natural Resources, OTA is investigating the issues relevant to oil shale development, including an analysis of the technological, social, environmental, economic, institutional, political, and other impacts—both beneficial and harmful—that may accompany the evolution of an oil shale industry. The final report will identify and analyze legislative policy options related to the development and use of oil shale technology.

Assessments in Progress (Continued)

Opportunities and Vulnerabilities of U.S. Dependence on Imported Nonfuel Minerals

Requested by the House Committee on Science and Technology, and endorsed by other House and Senate committees, this study is to examine the future availability of selected mineral imports, the role of these commodities in the domestic and international economies, and the public policy implications of U.S. reliance on foreign sources of supply. Unresolved situations arising from dependence on imported minerals will also be explored.

HEALTH AND LIFE SCIENCES

HEALTH

Cost-Effectiveness of Medical Technologies

Health technologies have contributed substantially to rapidly rising health care costs. Cost-effectiveness analysis is seen as a way to help allocate health resources more rationally. Such analysis compares the costs of alternate ways of attaining specified goals or effects. There is growing pressure to make cost-effectiveness a prime consideration in deciding whether to adopt particular medical technologies.

This assessment, originating from OTA's priority list and requested by the Senate Committees on Finance and Human Resources is examining the potential effects of using cost-effectiveness techniques. The study is evaluating: (1) the feasibility of employing cost-effectiveness analyses of several specific medical technologies as case studies; (2) the need for using cost-effectiveness techniques; (3) the social costs and benefits, the potential ethical, economic, political, and legal aspects; and (4) the feasibility of expanded use.

Pneumococcal Vaccine

During the past 15 years, the number of pharmaceutical companies developing and producing vaccines in the United States has dropped significantly. During this same period the Federal Government has increased its financial commitment to vaccine research and development. Some authorities maintain that the Federal Government should further increase vaccine R&D (and possibly even go into production), because of the private sector's growing disinterest.

Using the development of pneumococcal vaccine as a case study, this background report seeks to identify selected issues in three general areas: vaccine R&D in both the public and private sectors; the cost-effectiveness of preventing diseases through the use of vaccines; and factors that affect the use of preventive health technologies in general and vaccines in particular.

This report is also analyzing the cost-effectiveness of using pneumococcal vaccine as a preventive health measure in selected segments of the population.

Further, this report is identifying various factors that affect the use of vaccines, such as consumer awareness of vaccine benefits and risks, vaccine availability and cost, incentives to administer vaccines, liability for harm resulting from vaccination, and Government efforts to promote vaccine use. All of these factors need to be considered by public health planners when designing programs, either to prevent or to help treat disease.

Computer Technology and the Quality of Physician Services

Physician training involves the accumulation of knowledge and the application of that knowledge in the care of patients. OTA is examining how various computer technologies might be used to assess and/or improve this process, which includes medical school selection, undergraduate and graduate medical education, and clinical practice.

Computers can assist in and manage instructional programs, aid in testing, perform diagnostic, prognostic, and therapeutic functions, and manage large amounts of data. Computers will soon provide large data banks on student characteristics and performance, on physician and institutional performance in patient care, on the status of individual patients, and on the health status of various population groups.

The growth of large health- and medical-related computer banks will raise complex technical, political, and social questions involving the control, access, security, and privacy of such data.

Health Data Systems

The Federal Government lacks a coherent policy on gathering, analyzing, and using statistical information on people's health and the use of medical care resources.

Because of the lack of attention given to the numerous statistical activities of various Federal health programs, OTA undertook a study to determine both the extent to which Congress requires the collection of health statistics and the degree to which such activities are coordinated. This assessment has been divided into two parts. One study is examining all statutory authorities that require agencies within the Department of Health, Education, and Welfare to collect health data. The other is focusing on the lack of coordination among various Federal agencies that collect health data and outlines alternatives for integrating health data collection and use.

FOOD

Drugs and Chemicals in Livestock Feeding

Farmers and ranchers have widely adopted the use of various drugs and chemicals as additives in livestock and poultry feed. Used to protect animal

health and promote growth, this development is an integral part of the recent technological revolution in the production of meat, milk, and eggs. Other essential components of that revolution include sanitation, immunization, mechanization, and improved nutrition and breeding of livestock.

There has been a growing concern about the contribution the use of antibiotics in feed has on the development of drug-resistant bacteria as well as recognition that some of these drugs cause cancer in laboratory animals.

At the request of the Senate Committee on Agriculture, Nutrition, and Forestry, OTA is assessing the risks, real or potential, to human health from continued use of these drugs. Also being addressed are the benefits, especially the economic contributions and impact on increased food supplies, of these drugs. The effect on food prices of banning use of the drugs as feed additives is being assessed. A number of options ranging from continued use to complete withdrawal of the drugs, along with the risks and benefits of each, are being developed.

Open Shelf-Life Dating of Food

The purpose of using an open date on packages is to inform consumers about the shelf life of the product. Federal regulations have been established for other areas of information disclosure, such as nutrition and ingredient labeling and food grades. However, open dating has remained a voluntary program at the Federal level. Thus, there is no uniform or universally accepted open-dating system for food in the United States. In parts of the country, some food packages now have an open date in one form or another, whereas in other areas food packages lack an open date altogether.

Requested by the Senate Committee on Commerce, Science, and Transportation, this project is assessing the present status of open dating and its projected benefits and costs. It also is analyzing alternative techniques, criteria, systems, and enforcement methods for open dating and their impact on the food industry, consumers, and the economy.

Pest Management Strategies

In the past three decades, U.S. agriculture has become increasingly dependent on chemical pesticides to control weeds, insects, and diseases that destroy crops. Continued reliance on these chemicals alone now appears impossible. Heightened concern over their environmental effects, coupled with increased pest resistance and secondary pest outbreaks, severely limits the effective pesticides available to farmers. While these trends are found most fully in the United States, the problem is worldwide. If farmers are to meet the growing demand for food, new means for controlling pests are needed.

Requested by the Senate Committee on Agriculture, Nutrition, and Forestry, this assessment has three major objectives. The first is to assess the potential development and impact of pest management strategies in major regions of the United States over the next 10 to 15 years. The second is to evaluate Federal policies that constrain the development of technologies and strate-

gies to manage pests. The third objective is to assess the potential adaptation and impact of U.S. advances in pest management strategies on crop protection in developing countries.

Environmental Contaminants in *Food*

In the past decade, various foods have become contaminated by identified toxic substances in the environment. Polybrominated biphenyl (PBB) contaminated livestock feed and products in Michigan, and kepone in the James River of Virginia contaminated fish and other seafoods. This type of food contamination has led to actual or potential human health risks and has caused severe economic setbacks to the food producers whose products have been contaminated.

Requested by the House Committee on Interstate and Foreign Commerce, this assessment is addressing issues derived from the contamination of food by organic chemicals, metals and their complexes, and radioactive substances. The two major areas addressed by this assessment are tolerance and monitoring. The section dealing with tolerance will analyze present and alternative methodologies for determining acceptable limits and estimating economic impact. The section dealing with monitoring will analyze existing and future means for detecting environmental contaminants in food products, predicting substances that could potentially contaminate food, identifying and analyzing the components of a monitoring system, and evaluating both Federal and State capabilities for monitoring food.

GENETICS AND WORLD POPULATION

Impacts of Applied Genetics

"Applied genetics" refers to those technologies which can influence the biological characteristics inherited by man, animals, and plants. Recent advances in knowledge may greatly expand our capability to affect genetic characteristics to improve the quality of life. However, risks of inadvertent harm stem from these advances, many of which have not been fully examined for such risks.

To date, the Federal Government has focused on only one technology, recombinant DNA, and one issue, containment of new and possibly harmful organisms. Little attention has been given to other technologies, such as cell fusion, or to other issues, such as costs and benefits, and the social and ethical questions, raised by these new technologies.

Thus, issues requiring attention include:

- What are some key opportunities for society through applied genetics?
- What are some of the potential problems?
- Is Government regulation of research on genetics desirable considering the dichotomy between freedom of scientific inquiry versus social values and public risks?

Assessments in Progress (Continued)

- If regulation is desirable, who should exercise it and how extensive should it be?
- Who should own new life forms that have commercial value and could benefit mankind? (This involves issues of public rights versus property rights and incentives to innovations.)

Arising out of OTA's initial priority-setting process, this assessment will focus on the use of applied genetics technologies in agriculture and commercial /industrial processes and the prevention and treatment of inherited human defects.

SCIENCE, INFORMATION, AND TRANSPORTATION

OCEANS

Siting of Coastal Energy Facilities

In the short term at least, meeting the U.S. demand for energy will require new generating facilities, and this inevitably raises the question of where these facilities should be. This study is intended to identify broad issues associated with the siting of new powerplants in the coastal States of the United States.

The study concentrates on coastal States partly because this is where the sharpest increases in population and energy demand are expected and partly because of the new Federal Coastal Zone Management Act, which should influence siting decisions.

Over 200 interviews have been conducted with key people including Federal and State officials, businessmen, utility and energy company officials, labor representatives, and spokesmen for environmental and other special interest groups. Questions were designed to provide an energy profile of selected States, with an emphasis on determining the influence of the various governmental units and whether some of these units are at odds with others.

Renewable Energy From the Oceans

The rush to find energy alternatives to petroleum has led many people to consider the potential of the world's oceans. Currently, the most discussed ocean energy extraction method is Ocean Thermal Energy Conversion (OTEC), which aims to use the temperature difference between deep cold ocean waters and warmer surface waters to produce power. OTA has already issued an assessment of OTEC technology.

That assessment prompted a logical question: what are the current prospects for other known renewable ocean energy systems which do not receive the support and level of Department of Energy R&D funding enjoyed by OTEC?

These "other" renewable ocean energy sources include ocean winds, tides, currents, waves, and salinity gradients.

OTA is commissioning studies of each of these candidate energy systems to pinpoint the status of the research efforts. Tidal technology is proven already and in place in France, where the French Government has constructed an electricity-generating plant.

Disposal of Nuclear Waste

Although we are more than three decades into the nuclear age, the ever-growing volume of high-level waste from weapons manufacture and power-plant operations is almost all still in "temporary" storage. Permanent isolation of this radioactive waste is essential since exposure to some of its elements can pose a threat to human life for over 1 million years.

OTA is now assessing the state of the art of disposal of high-level radioactive wastes generated by nuclear powerplants. Also to be investigated are the social and environmental aspects of the issue, which are sometimes not addressed in more narrowly focused studies.

The study is exploring such questions as:

- What steps are involved in selecting, evaluating and licensing potential waste repository sites?
- What is involved in developing and managing a full-scale waste disposal system?
- What is the role of State and local governments in management of nuclear wastes?
- What additional research and development work is needed to demonstrate the ability to safely dispose of nuclear waste?

NATIONAL R&D PRIORITIES AND POLICIES

Technology *for Local Development*

Technologies now being developed, such as land disposal of waste water, 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, the use of renewable resources, and are compatible with local capital and environmental requirements. Such technologies have often been characterized as "appropriate technologies." This project will examine several prototype technologies in order to assess the extent to which appropriate technologies can contribute to attaining domestic urban and rural community goals. The project will assess the feasibility and potential impacts of these technologies, as well as the institutional structures necessary to develop and apply them. It will also identify and develop policy options for the Congress which deal with proposals for Federal program coordination, financing R&D, and other relevant means of

Assessments in Progress (Continued)

enhancing beneficial impacts and minimizing adverse impacts of technologies for local development.

Technological Innovation and Health, Safety, and Environmental Regulation

Regulatory policies to minimize the risks posed by technology to health, safety, and the environment have become the focus of increasing controversy. The purpose of this project is to evaluate 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. Achieving this objective requires understanding how regulatory policies, when integrated with technical, market and financial considerations at the corporate level, influence private investments in innovation. This assessment will frame the issues, and examine some specific cases in order to begin developing a knowledge base that will be useful for forming policy decisions in this area.

The National Laboratories Assessment

The purpose of the national laboratories assessment is to evaluate the role and performance of federally funded research and development centers and civil service laboratories. The assessment addresses three aspects of these laboratories: 1) their present institutional structure; 2) the role they play in the overall scientific endeavor of the country; and 3) ways in which they can be directed toward the solution of national problems. Intergovernmental access, quality control, and the capacity for the labs to serve an early warning function in national problem areas round out the assessment.

TELECOMMUNICATION AND INFORMATION SYSTEMS

Societal Impacts of Information Systems

Through three broadly representative case studies—the National Crime Information Center, emerging electronic message systems, and electronic funds transfer systems—OTA is assessing the impacts of national information systems on society. The study includes multiple services such as criminal justice, mail, research, education and marketing, and includes personal services such as banking, shopping, and library services. National and international issues and policies are being examined. Particular attention is being given to issues of privacy and civil liberties and alternative policies to encourage use of information technologies while limiting or controlling adverse societal impacts of such systems.

Telecommunication Systems Assessment

The Telecommunication Systems study is examining the impacts of emerging telecommunication technologies on society. Areas being studied in-

elude: economic, social, legal, and policy issues; national and international industry structure; governmental uses and regulation of telecommunication systems; and potential biological and environmental effects. Also included are major international issues such as: the timing of new undersea cable and transoceanic satellite facilities; emerging impediments to transborder data flow; and satellite broadcasting impacts.

TRANSPORTATION

Railroad Safety: Canadian Comparison

At the request of the House Commerce Committee, OTA is conducting a detailed comparison between railroad safety conditions in the United States and Canada. The OTA comparative analysis identifies the similarities and differences between the United States and Canadian rail systems and safety practices. Findings thus far indicate that the differences in rail-related fatality rates are primarily a function of the differences in size and exposure levels of each nation's population. The study also suggests that the different approaches to safety in the two countries are a function of the size and structure of the Canadian rail system and the structure and size of the government entities with responsibility for safety. In addition, the economic deregulation of Canadian railroads, which occurred in 1967, created a more favorable economic climate for the rail industry, which, in turn, provides a better environment for safety improvements.

The Future Use and Characteristics of the Automobile Transportation System

The automobile is the predominant form of personal transportation in the United States. Over 85 percent of all households now own at least one automobile and more than 90 percent of the passenger miles traveled each year are by private automobile.

Along with the social and economic benefits conferred by the automobile have come certain problems. The future supply of petroleum is uncertain. Air pollution is a major urban problem. Death and injury on streets and highways continue to mount. Traffic congestion strangles movement in cities. Roadways, parking lots, and automobile-related facilities take up land and contribute to urban sprawl. Maintaining the present automobile and highway system and meeting the future personal transportation needs of the country will call for large capital investments.

Requested by the Senate Committee on Commerce, Science, and Transportation, this assessment addresses changes in the future use and characteristics of the automobile transportation system, potential technological developments and their anticipated effects to the year 2000 and beyond, and factors that could influence the evolution of the system.

Assessments in Progress (Continued)

Impacts of Advanced Air Transport Technology

The civil aviation industry in the United States has dominated the free world aircraft market for the past 40 years largely because of the technological base provided by NASA and DOD R&D, and by an industry oriented toward technological development. This superiority is now being challenged by consortiums in Western Europe, backed by their respective governments, with developments such as the A-300 Airbus.

Potential new developments in aviation should permit the U.S. industry to continue its contribution to the Nation's economy, but at issue is the question of the extent of Federal support of civil aviation technology, particularly where long-term and high-risk R&D projects are concerned.

Requested by the House Committee on Science and Technology and the Senate Committee on Commerce, Science, and Transportation, this assessment addresses the potential technological developments and their impacts in the field of advanced transport aircraft for passengers and cargo over the next 15 to 30 years. Included in the study are advanced supersonic transport, commuter, cargo, hypersonic, V/STOL, and energy efficient subsonic aircraft, lighter-than-air vehicles, and general aviation. The study examines the potential economic, environmental, energy, safety, social, and political implications of the introduction, or the nonintroduction, of such aircraft. The study is intended to provide Congress with information needed to determine the appropriate level of Federal support.

Impacts of Advanced Group Rapid Transit Technology

Advanced Group Rapid Transit (AGRT) is a public transportation system concept embodying fully automated small vehicles operating at short headways on exclusive guideways. The system is being developed by the Urban Mass Transportation Administration. OTA is conducting a preliminary analysis at the request of the House Appropriations Committee. At issue is the cost of the program and its potential for enhancing urban mobility and ameliorating other problems associated with urban transportation.

EXPLORATORY AND PLANNING

Natural Hazards

At the request of the House Committee on Banking, Finance, and Urban Affairs, the Senate Committee on Banking, Housing, and Urban Affairs, and the Senate Committee on Appropriations, OTA initiated a planning study on

natural hazards and their social, economic, environmental, and political consequences. Staff studies and workshops identified and clarified issues and trends, and offered some policy options. An operational and policy framework based on the lifecycle of a natural hazard has been developed.

A five-volume preliminary analysis to be completed in January 1979 will include:

- Confronting Nature: A Preliminary Analysis of U.S. Policy Needs Related to Natural Hazards
- Issues and Options in Flood Hazards Management
- Criteria for Evaluating the President's Reorganization Plan for Emergency Preparedness and Response
- Criteria for Evaluating the Implementation Plan Required by the Earthquake Hazards Reduction Act of 1977
- Disasters in the Developing Countries: Lessons Applicable to U.S. Domestic Preparedness.

Approaches to Risk Assessment

Currently, inadequate understanding of the parameters of risk prevents governments from being able to plan and execute comprehensive activities to deal with the full range of risks resulting from both natural and manmade causes. OTA is undertaking a comprehensive review and analysis of risks to which humankind is exposed on an individual, regional, national, international, and global basis. A systematic inventory of the scope, scale, intensity, numbers of people affected, and trends with regard to technological risks will be provided as a basis for improving public policy dealing with risk.

This comparative analysis of a large number of risks will develop systematic information with regard to each risk and attempt to develop a time history, including the rates of change of risks over an interval useful to public policy.

The project will directly serve OTA's internal needs for a more systematic approach to risk. It is also planned to provide a framework for improved congressional interpretation and deliberation on risks and hazards.

Measures of Quality of Life as a Basis for Assessing Technological Choices

Growing dissatisfaction with such economic measures as GNP (gross national product) are based on the fact that they do not and cannot fully reflect prevailing social conditions. GNP counts market-priced goods and services but disregards activities outside the market and ignores the reasons for a transaction. Thus, GNP includes as positive measures the costs of dealing with systems breakdowns, waste disposal, repair and maintenance—despite the fact that these are negative symptoms with regard to quality of life. New measures are needed to deal with life quality, attitudes, aspirations, goals, and satisfactions. Various branches of the Federal Government recognize this need for a

Assessments in Progress (Continued)

more adequate expression of human impacts and conditions and have begun delineating approaches such as social accounting, social indicators, etc. The U.N. and the OECD have also initiated similar investigations, realizing the absolute necessity of measures other than economic to determine real development in the Third World. To date, however, no consensus exists on 1) what should be measured and how, and 2) the framework by which the meaning of the indicators can be presented in a useful way.

The overall goal of this project is to explore the application of the quality of life concept to technology policymaking by concentrating on the following:

- An analysis of current efforts by government agencies, academia, and the private sector to develop various social indicators and methods of social accounting.
- An evaluation of strengths and weaknesses of current indices and measurement category gaps to result in the development of a new index for quality of life to reflect the interconnection of various human activities and new conceptions of value, such as time vs. money, pain vs. death, the work/play ratio needed for psychic health.
- Evaluation of alternative methods for data display of the results of quality of life indexing to ensure utilization by those who require the information.
- Estimation of the impact on technologically related decisionmaking of the existence of good quality of life data; evaluation of ways in which the Congress can both foster this development and utilize it in preparing legislation.

Non-Ionizing Radiation Hazards

In response to a request of the House Committee on Interstate and Foreign Commerce, OTA is conducting a preliminary anaysis of the issues associated with microwave and other non-ionizing radiation hazards. The study is considering the hazards as well as the benefits associated with present and potential uses of the whole range of non-ionizing radiation, including those parts associated with high-tension powerlines, laser beams, and all radiofrequency radiation.

The preliminary analysis seeks to explore the principal public policy issues confronting the Congress in this area and identify the technological factors which give rise to them. It considers the kinds of technical and nontechnical information most likely to be needed in order to identify policy options and the consequences of pursuing one or another. This analysis, based on recent reports and interviews, also aims to identify relevant statutes, responsible authorities, existing standards, and centers of governmental and nongovernmental activity and analysis, and indicate some of their limitations.