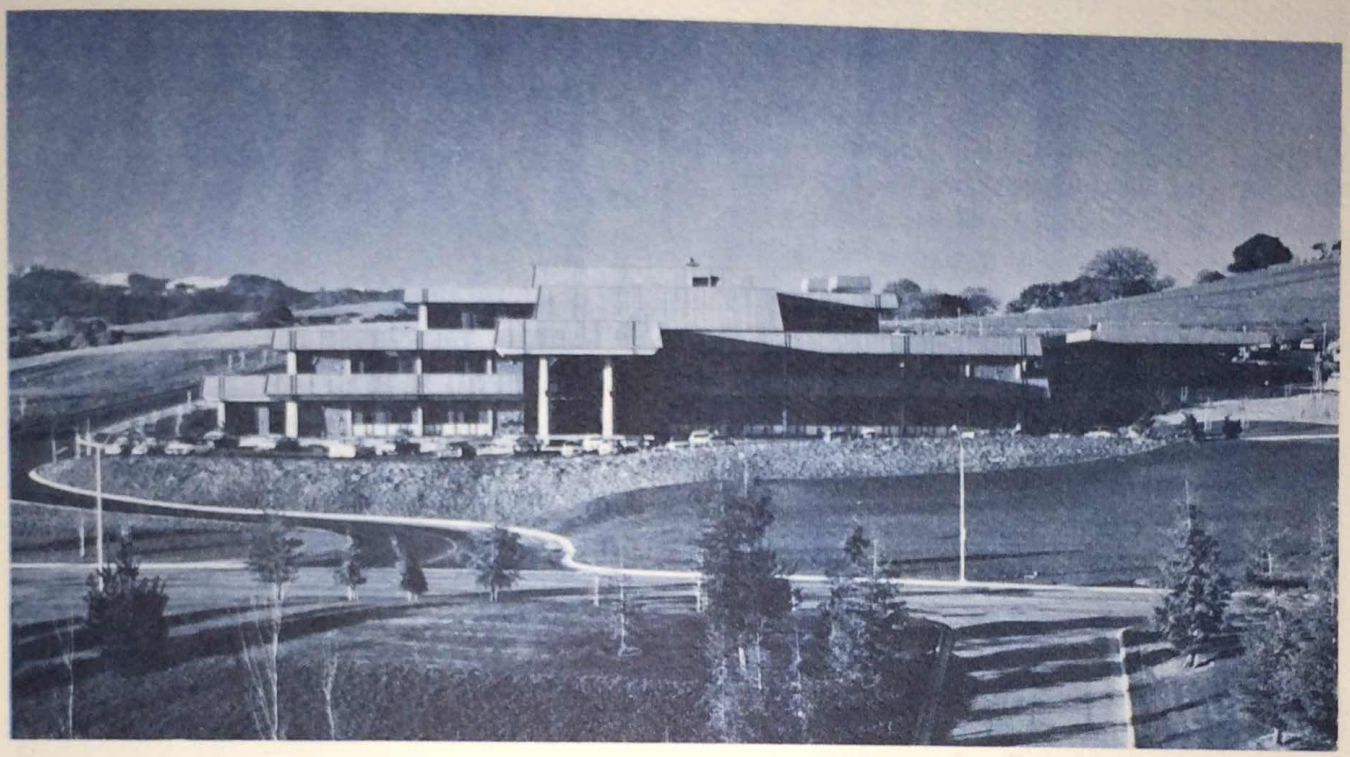
ELECTRIC POWER RESEARCH INSTITUTE



"One of the great challenges of our time is that of matching energy production and utilization with progress . . . in harmony with nature."

The Electric Power Research Institute (EPRI) began operations in 1973 for the purpose of expanding electric energy research and development under the voluntary sponsorship of the nation's utility industry, public, private, and cooperative. Its goal is to develop a broad, coordinated, advanced technology program for improving electric power production, transmission, distribution, and utilization in an environmentally acceptable manner.

EPRI represents a major milestone in utility industry R&D cooperation and response to the electric energy problems we face today.

The primary areas of EPRI's research are nuclear power; fossil fuel and advanced systems; power transmission and distribution; and energy systems, environment, and conservation.

HISTORY

The beginning of the EPRI concept can be traced to 1965, when the Electric Research Council (ERC) was organized to encourage all sectors of the electric utility industry to join in cooperative sponsorship of electric energy research. ERC brought together representatives of the Edison Electric Institute (EEI), the Tennessee Valley Authority, the American Public Power Association, the National Rural Electric Cooperative Association, and the U.S. Department of the Interior.

By the late 1960's the utility industry found itself caught between meeting increasing energy demands on the one hand and rapidly growing environmental concerns on the other. Diminishing gas and oil reserves and production and increasingly stringent environmental standards turned a potential energy problem into a reality. It became evident that a tremendous R&D challenge lay ahead for the rest of the century.

In the fall of 1969, ERC set up a special R&D Goals Task Force to establish a blueprint for utility industry research and development through the year 2000. The Task Force report, issued in 1971, was the most comprehensive study ever developed on electric utility R&D requirements. It called for

total R&D expenditures by the utility industry, federal government, and electric equipment manufacturers averaging $1.12 billion annually for the balance of the century.

Concurrent with the study, ERC worked out details for an industry-wide organization to provide direction and support for this ambitious undertaking. The result was the Electric Power Research Institute which succeeded the Electric Research Council and assumed management responsibility for the R&D programs of the EEI and the ERC.

The ERC did an outstanding job of bringing all segments of the industry together to support research work. But its most important contribution was to lay the foundation for a strong national utility industry organization with authority, technical and administrative expertise, and greatly increased funding, to develop and coordinate industry-wide energy research.

The Electric Power Research Institute appointed Dr. Chauncey Starr as its first president on January 1, 1973. Formerly Dean of the School of Engineering and Applied Science, University of California at Los Angeles, Dr. Starr is one of the country's most distinguished and experienced leaders in energy development. He served as Vice President for Rockwell International and President of its Atomics International Division during his 25-year career prior to joining the UCLA faculty.

EPRI occupied its headquarters in Palo Alto in September, 1973. The same month the Institute opened an office in Washington, D.C. to provide for close coordination of EPRI research programs with parallel efforts of federal agencies such as the Office of Coal Research, the National Science Foundation, and the Atomic Energy Commission.

As of September 1, 1974, EPRI had 220 research projects under management or in contract negotiations. The total value of these projects, over their contract lifetimes, is $195 million dollars, including funding from other organizations.

OBJECTIVES OF EPRI

Major objectives of the Electric Power Research Institute, as set forth in the Articles of Incorporation, include the following:

- *To promote, engage in, conduct, and sponsor research and development for electricity production, transmission, distribution, and utilization and all activities directly or indirectly related thereto.*
- *To provide a medium through which investor-owned, government-owned, and cooperative-owned power producers and all other persons interested in the production, transmission, distribution, or utilization of electricity can sponsor electricity research and development for the public benefit.*
- *To discover, through study and research, ways to improve the production, transmission, distribution, and utilization of electric power, in order to insure the adequate power supply vital to the progress of the nation and the world community.*
- *To seek, through scientific research and development, solutions to the environmental problems related to the production, transmission, distribution, and utilization of electric power.*
- *To provide a medium for coordination and cooperation and for the exchange of information, among all organizations, public or private, concerned with electric power research and development.*
- *To develop, prepare, and disseminate information and data on scientific research and development activities in the field of electric power.*

EPRI will not make operating decisions for the utility industry or for government bodies. Its mission is to focus national utility R&D resources on continuously providing the technological options needed for insuring that future electricity demands can be met in a manner that best serves the overall public good.

STAFF STRUCTURE

To carry out its mission, EPRI will require a staff of 250 to 300. A substantial number of these people will be on loan from utilities and suppliers, on sabbatical leave from universities, or on post-doctoral assignments.

The EPRI technical staff is composed of four divisions.

THE NUCLEAR POWER DIVISION is responsible for research projects in the areas of nuclear safety and analysis, engineering and operations, and nuclear materials.

THE FOSSIL FUEL AND ADVANCED SYSTEMS DIVISION promotes the development of new technology for using fossil fuels – particularly

coal – in environmentally acceptable ways. This division is also in charge of developments related to conversion and storage systems and new energy sources, including fusion, solar, geothermal, magnetohydrodynamics, fuel cells, and other advanced systems.

THE ENERGY SYSTEMS, ENVIRONMENT AND CONSERVATION DIVISION is concerned with energy supply and demand studies, environmental considerations, energy conservation, and system planning and simulation.

THE TRANSMISSION AND DISTRIBUTION DIVISION handles projects including underground transmission, ac overhead and dc transmission, system reliability, and development of better distribution systems.

The major responsibilities of these divisions are 1) to assist in determining the relative emphasis to be placed on research in the various fields over the short and long term, 2) to make recommendations on R&D projects under consideration for EPRI funding, 3) to closely monitor EPRI-sponsored research projects, and 4) to promote continuing coordination and communications with other research activities in their fields.

Initially, hardware research will take place where it can best be performed – in manufacturers' facilities, universities, or government laboratories – with close project management by EPRI staff. EPRI may also operate (and own) facilities that either exist now or may be built in the future. These will be located wherever both talent and existing facilities make the work most productive. EPRI facilities may develop into regional centers – each specializing in some nationally significant area of research.

In addition to the technical divisions, there is an administrative division and other functions such as planning and communications at EPRI.

To accomplish this unique and critical research effort, EPRI has attracted highly qualified individuals.

Senior staff members, in addition to Dr. Starr, EPRI president, are:

Richard E. Balzhiser, *Director,* Fossil Fuel and Advanced Systems–formerly Assistant Director, White House Office of Science and Technology.

Milton Levenson, *Director,* Nuclear Power–previously Associate Director, Energy and Environment, Argonne National Laboratory.

E. Robert Perry, *Director,* Transmission Department (and Acting Director, Transmission and Distribution Division)–formerly Director of Research, Power Equipment Group, I-T-E Imperial Corporation.

Sam H. Schurr, *Director,* Energy Systems, Environment and Conservation–formerly Director of Energy and Mineral Resources, Resources for the Future, Inc.

Robert L. Loftness, *Director,* Washington, D.C. Office–previously Deputy Director for Technology, Office of Atomic Energy Affairs, U.S. Department of State.

Robert A. Sandberg, *Director,* Communications–formerly Senior Vice President, Corporate Public Policy, for Kaiser Industries Corporation.

David Saxe, *Director of Administration*–formerly Vice President, Business Management, Atomics International Division of Rockwell International Corporation.

Henry A. Darius, *Secretary*–formerly Assistant Secretary and Counsel, Northeast Utilities and its subsidiary companies.

Louis O. Elsaesser, *Assistant to the President*–previously Director of Research, Edison Electric Institute.

Richard L. Rudman, *Assistant to the President*–previously engineering computing consultant to IBM.

Cyril L. Comar, *Director,* Environmental Assessments Department–previously Professor and Head, Department of Physical Biology, and Director, Laboratory of Radiation Biology, Cornell University.

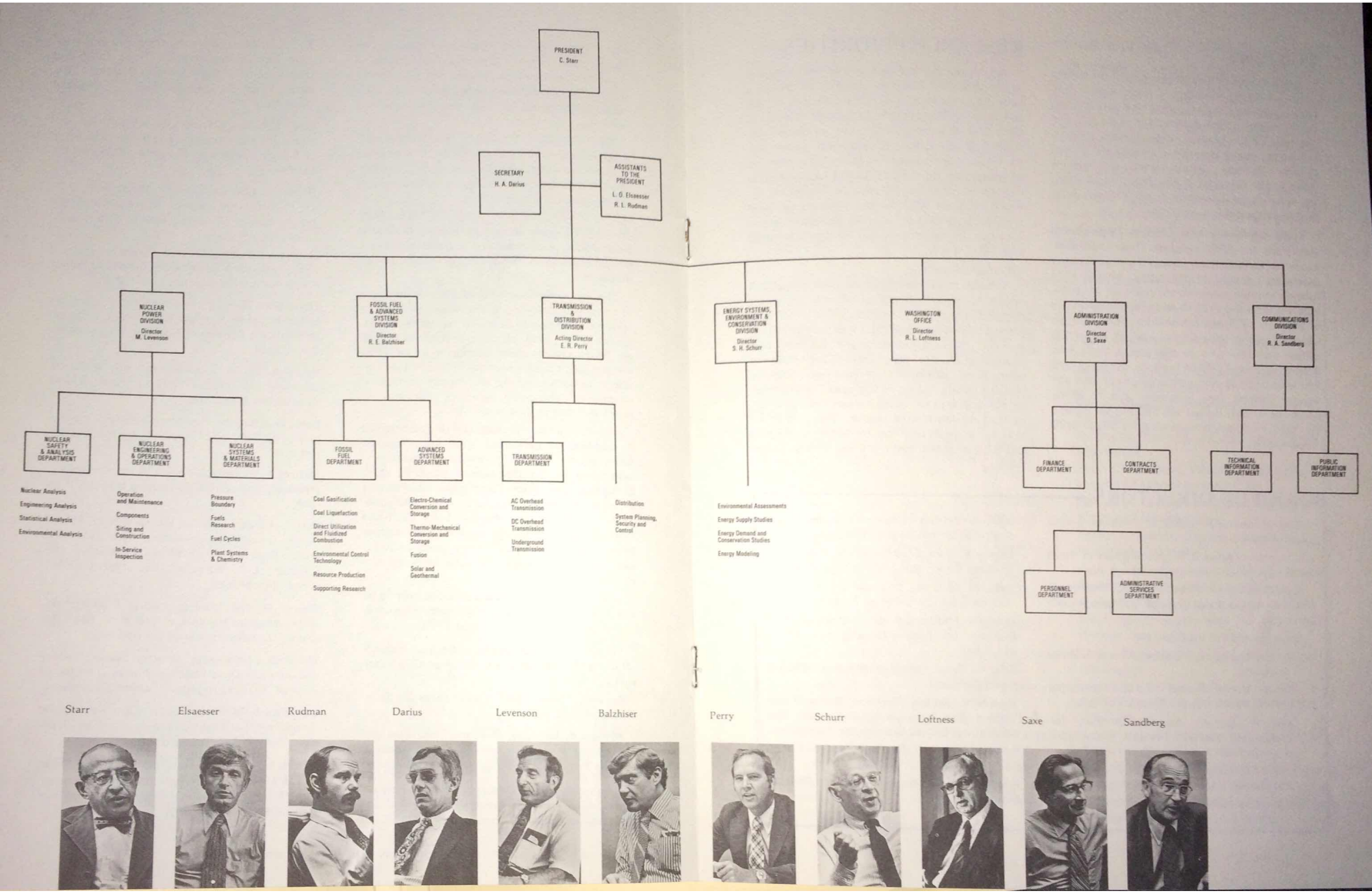
George R. Hill, *Director,* Fossil Fuel Department–previously Director, Office of Coal Research, U.S. Department of the Interior.

Walter B. Loewenstein, *Director,* Nuclear Safety and Analysis Department–formerly Director of Applied Physics, Argonne National Laboratory.

Lawrence E. Minnick, *Director,* Engineering and Operations Department–previously Vice President, Yankee Atomic Electric Company.

Edwin L. Zebroski, *Director,* Nuclear Systems and Materials Department–formerly Manager, Fuel Programs, Nuclear Engineering Division, General Electric Company.

An EPRI organization chart is on the next two pages.



Starr

Elsaesser

Rudman

Darius

Levenson

Balzhiser

Perry

Schurr

Loftness

Saxe

Sandberg

FUNDING

EPRI is supported by all segments of the electric utility industry including investor-owned companies, publicly-owned agencies, rural cooperatives, the Tennessee Valley Authority, and the U.S. Department of the Interior. In most cases, investor-owned companies participate through the Edison Electric Institute, public-owned organizations through the American Public Power Association, and rural cooperatives through the National Rural Electric Cooperative Association.

There are nearly 500 member organizations supporting the EPRI program. These utilities account for approximately 85% of the electric power generating capacity of the nation. By the 1974 funding formula, members are called on to contribute the equivalent of .10 mills per kilowatt hour of sales. In 1975, the rate will be 0.115 mills per kilowatt hour of sales. Of this amount, about $25 million annually goes to the Liquid Metal Fast Breeder Reactor (LMFBR) Program, and up to 20% for research and development programs of local and regional interest. The remainder goes to EPRI, whose 1974 R&D budget was $68 million dollars. For 1975, this figure is expected to be $90 to $100 million dollars.

RESEARCH PRIORITIES

A principal factor in determining R&D priorities is the very long lead time required for any new technology to have a significant impact on the ability of utility systems to provide electricity. Only near-term technologies, now in the demonstration phase, are likely to have much impact prior to 1985. Intermediate-term technologies that are of proven scientific feasibility but require further engineering development may be important between 1985 and 2000. Finally, there are the long-term projects whose scientific feasibility is still uncertain and which may not be significant until after 2000, if ever.

HIGHEST PRIORITY

Research toward technological options that will permit continuing utilization of coal for power production in new and retrofit applications in conformance with environmental standards is of high priority. This work includes coal liquefaction, coal gasification and coal beneficiation. Clarification of safety issues, particularly for light water (conventional) reactors, is one of the most pressing near-term concerns in the nuclear power field. Development of the fast breeder reactor, which would extend our uranium resources for hundreds of years, and the gas-cooled reactor are also of high importance.

BOARD OF DIRECTORS

The 15-man EPRI Board of Directors is composed of the following:

Chairman is **James E. Watson**, Manager of Power for the Tennessee Valley Authority.

Vice Chairman is **Shearon Harris**, President & Chairman of the Board of Carolina Power & Light Company.

Other members of the Board are:

T. L. Austin, Jr., *President*, Texas Utilities Company.

John F. Bonner, *President and Chief Operating Officer*, Pacific Gas and Electric Company.

Jack W. Carlson, *Assistant Secretary for Energy and Minerals*, The U.S. Department of the Interior.

Robert F. Gilkeson, *Chairman of the Board*, Philadelphia Electric Company.

Robert W. Gillette, *Manager*, Public Utility District of Grant County, Washington.

Jack K. Horton, *Chairman of the Board*, Southern California Edison Company.

Charles F. Luce, *Chairman of the Board*, Consolidated Edison Company of New York, Inc.

John M. McGurn, *Chairman of the Board*, Virginia Electric and Power Company.

Robert V. Phillips, *General Manager and Chief Engineer*, Los Angeles Department of Water and Power.

John G. Quale, *President*, Wisconsin Electric Power Company.

Thomas C. Shirley, *Chairman*, Research and Technological Development Committee, National Rural Electric Cooperative Association.

Lelan F. Sillin, Jr., *Chairman and President*, Northeast Utilities.

Frank M. Warren, *President*, Portland General Electric Company.

Improvements in the transmission of electricity are also of near-term importance. The carrying capacity, efficiency, and esthetics of our transmission systems must be improved. EPRI and equipment manufacturers will closely coordinate their efforts in this area. Superconducting transmission lines appear to have exciting possibilities for the 1985 to 2000 period. EPRI works closely with federal agencies in sponsoring this research.

Intermediate term R&D in the EPRI program includes fuel cells, high capacity storage batteries, solar energy conversion, magnetohydrodynamics, and novel topping and bottoming cycles, all considered to have substantial payoff possibilities.

POTENTIAL JUSTIFIES FUNDING

An example of long-term R&D, post-year-2000 payoff is fusion—both the magnetic confinement and the laser-pellet concepts. These still pose significant scientific uncertainties which make their feasibility difficult to assess at the present time. However, the eventual payoff for success is large and the national effort in fusion is justified because of the possibility of providing the post-2000 era with a near limitless energy option. Because of its complexity, fusion research may require a substantial and continuing investment for several decades before a tangible public benefit becomes evident.

ADVISORY COUNCIL

The ultimate goal of the EPRI research program is to develop technology in the best interest of all segments of our society. This mission can be accomplished only through continuing communications with all sectors of the general public. What are their needs? Their concerns? Their ideas? How well do they understand the various facets of today's energy situation?

The EPRI Advisory Council, composed of prominent leaders from government, labor, education, science, and business, provides this liaison between the public served by the utilities and the Board, officers, and staff of EPRI.

The Advisory Council meets quarterly to reflect public attitude and needs and make recommendations relating to EPRI program direction.

Chairman of the Advisory Council is **Joseph L. Fisher**, formerly President, Resources for the Future, Inc. *Vice Chairman* is **Arthur C. Stern**, Professor of Air Hygiene, University of North Carolina. Other members are listed below.

George I. Bloom, *Chairman*, Pennsylvania Public Utility Commission.

Erwin D. Canham, *Editor Emeritus, The Christian Science Monitor.*

Charles C. Coutant, Environmental Sciences Division, Oak Ridge National Laboratory.

Ruth M. Davis, *Director*, Institute for Computer Sciences and Technology, National Bureau of Standards.

Arthur G. Hansen, *President*, Purdue University.

Alfred E. Kahn, *Chairman*, New York Public Service Commission.

Thomas L. Kimball, *Executive Vice President,* National Wildlife Federation.

James F. Mauze, *Chairman*, Missouri Public Service Commission.

William D. McElroy, *Chancellor*, University of California at San Diego.

Martin Meyerson, *President,* University of Pennsylvania.

Pat Moran, *Chairman,* Arkansas Public Service Commission.

Bruce C. Netschert, *Vice President*, National Economic Research Associates, Inc.

William A. Nierenberg, *Director*, Scripps Institution of Oceanography.

Arthur L. Padrutt, *Chairman,* Wisconsin Public Service Commission.

Ruth Patrick, *Chairman*, Limnology Department, The Academy of Natural Sciences.

Charles H. Pillard, *International President,* International Brotherhood of Electrical Workers.

Elvis J. Stahr, Jr., *President*, National Audubon Society.

Joseph C. Swidler, *Director*, Institute for Public Policy Alternatives, State University of New York.

John P. Vukasin, Jr., *Commissioner*, California Public Utilities Commission.

John G. Winger, *Vice President*, The Chase Manhattan Bank.

Marvin R. Wooten, *Chairman*, North Carolina Utilities Commission.

INDUSTRY ADVISORY GROUPS

More than 250 utility industry executives and engineers serve on EPRI's industry advisory committees. The 20 members of the Research Advisory Committee, the senior group in the Institute industry committee structure, work with EPRI's President and Board of Directors to identify R&D needs of the utility industry. In addition, they coordinate the activities of the entire structure.

Four Divisional Committees, corresponding to the four EPRI technical divisions, advise the division directors. Task forces in each major research area work in more detail with the divisions, assessing needs, and measuring priorities and program values. Subcommittees, formed at the option of the task forces, are functioning at the program level in much the same way as task forces.

RESEARCH ADVISORY COMMITTEE

Chairman of the Research Advisory Committee is **L. F. Lischer**, Vice President in charge of Engineering Research and Technical Activities, Commonwealth Edison Company.

Divisional Committee Chairmen, also members of the Research Advisory Council, are:

Fossil Fuel and Advanced Systems: **H. L. Falkenberry**, *Chief, Power Research Staff,* Tennessee Valley Authority.

Nuclear Power: **H. M. Dieckamp**, *Executive Vice President,* General Public Utilities Service Corporation.

Energy Systems, Environment, and Conservation: **Lawrence T. Papay**, *Director of Research and Development*, Southern California Edison Company.

Transmission and Distribution: **Robert A. Bell**, *Director, Research and Development,* Consolidated Edison Company of New York, Inc.

Other members of the Research Advisory Committee are:

Perry G. Brittain, *President*, Texas Utilities Services, Inc.

John J. Bugas, *Manager,* Colorado-Ute Electric Association.

A. G. Bullard, Jr., *Director of Research*, Carolina Power & Light Company.

R. F. Cayot, *Chief, Department of Engineering Research*, Pacific Gas & Electric Company.

Gerald F. Diddle, *General Manager*, Associated Electric Cooperative, Inc.

G. E. Dreifke, *Manager*, Research & Development, Union Electric Company.

S. William Gouse, Jr., *Director, Office of Research & Development*, United States Department of the Interior.

Edward S. Halfmann, *Director of Research,* Philadelphia Electric Company.

W. B. Harrison, *Vice President, Research,* Southern Services, Inc.

Raymond A. Huse, *Manager of Research & Development*, Public Service Electric & Gas Company.

Hilbert S. Johnson, *Senior Vice President,* Portland General Electric Company.

S. Hale Lull, *Vice President, Planning & Research*, Northeast Utilities.

Harold Lurie, *Director of Research & Development*, New England Electric System.

R. J. McMullin, *General Manager,* Salt River Project Agriculture Improvement & Power District.

Lawrence J. Simpkin, *Director of Engineering Research*, Detroit Edison Company.

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