

Metallurgy and Ceramics

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Material Sciences
B&R Code: KC0201

Laboratory Complex

Principal Laboratories:
Contributing Laboratories: Ames, ANL, LBNL, ORNL, SNL
Participating Laboratories: BNL, INEL, LANL, LLNL, NREL, ORISE, PNNL

Mission Activity Description

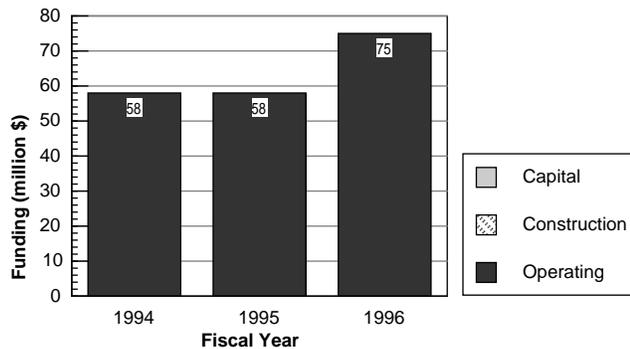
Material Sciences supports basic research for the development of technologies for the efficient production and use of energy. Every technology is materials limited, and new materials can lead to new energy, automotive, and environmental technologies and markets.

Material Sciences enables technology. The performance parameters, economics, environmental acceptability, and safety of all energy generation, conversion, transmission, and conservation technologies are limited by the performance of materials. Research in material sciences is concerned with optimizing the behavior and performance of these technologies. This research seeks to understand the synthesis, processing, structure, properties, and behavior of materials to discover new technological capabilities.

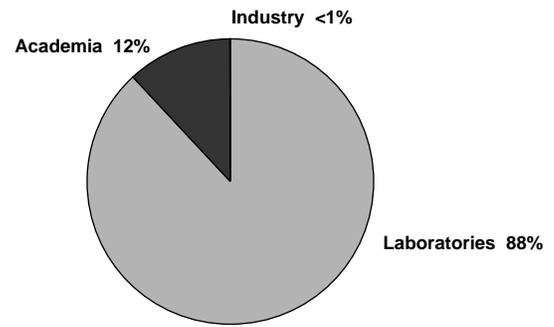
Material Sciences supports the operation of unique facilities that are not otherwise available to the scientific community and their application to energy-related materials problems.

The metallurgy and ceramics research area of material sciences investigates the synthesis, processing, structure, and properties of metals and ceramics for energy, environmental, and automotive needs. Research thrusts are aimed at improving safety and reliable performance of materials. For example, surface modifications reduce friction and wear, modelling of near-net shape fabrication processes reduces the cost and improves the performance of complex materials systems, and new methods for welding and joining of metal and ceramic materials open up new technological opportunities, including service in radiation, high-temperature, and corrosive and erosive environments and for solar and photovoltaic applications. Manufacturing processes are improved by nondestructive evaluation monitoring and other applications of new instrumentation.

Funding History

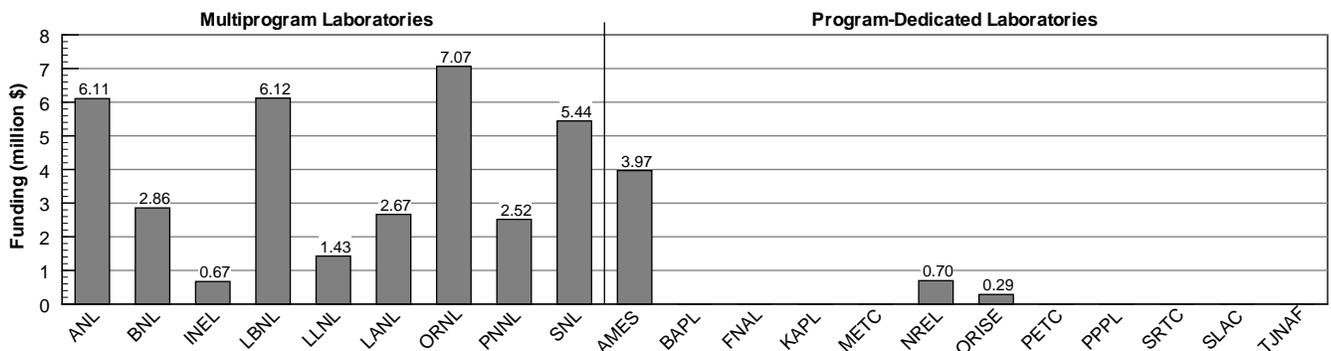


Laboratory-Academia-Industry Participation



FY 1995 Data
 Note: Breakdown is average over Material Sciences.

Fiscal Year 1995 Funding Profile



Solid-State Physics

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Material Sciences
B&R Code: KC0202

Laboratory Complex

Principal Laboratories: ORNL
Contributing Laboratories: ANL, BNL, LBNL
Participating Laboratories: AMES, INEL, LANL, LLNL, NREL, PNNL, SNL

Mission Activity Description

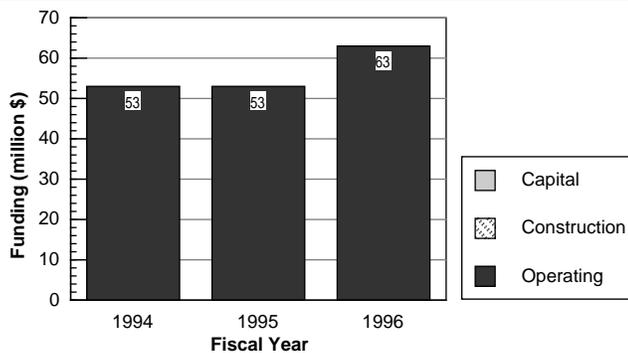
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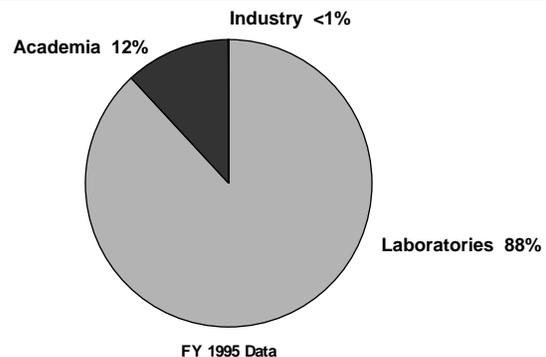
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The solid-state physics research area focuses on advancing understanding of materials properties by use of synchrotron radiation and neutron scattering, thus enabling the exploration of materials properties that could be accomplished by no other means. Specific thrusts focus on the energy-related properties of materials, including understanding the physics of high-temperature superconductivity; the physics of surfaces and interfaces; development of novel characterization methods; and magnetic, photonic, and photovoltaic materials, and related instrumentation.

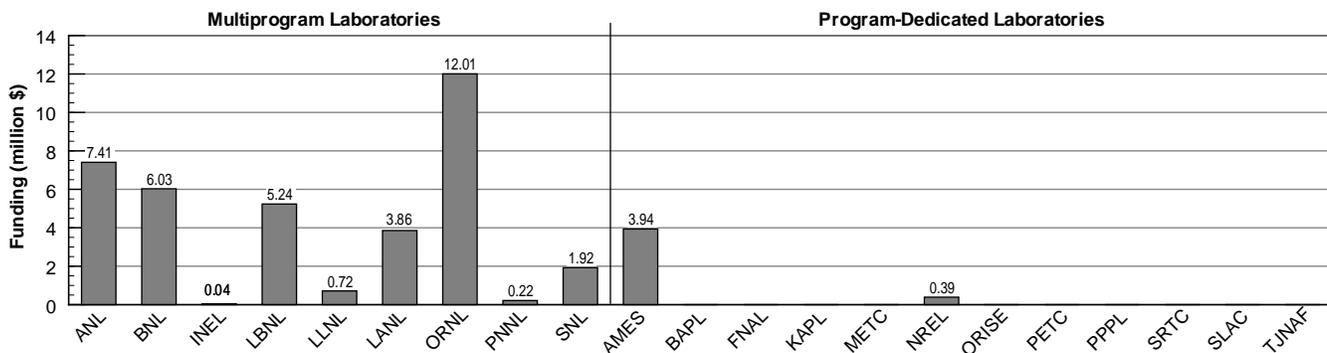
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Materials Chemistry

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Material Sciences
B&R Code: KC0203

Laboratory Complex

Principal Laboratories: ANL, LBNL
Contributing Laboratories: Ames, ORNL
Participating Laboratories: BNL, INEL, LANL, LLNL, PNNL, SNL

Mission Activity Description

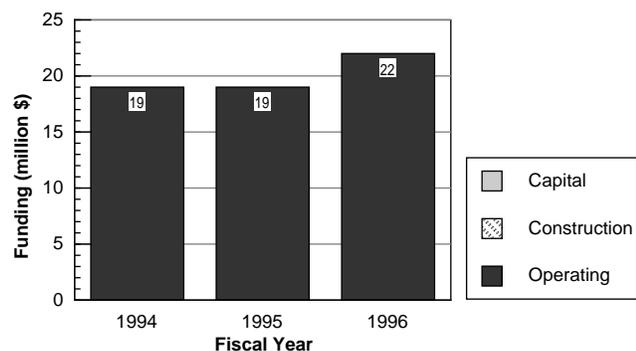
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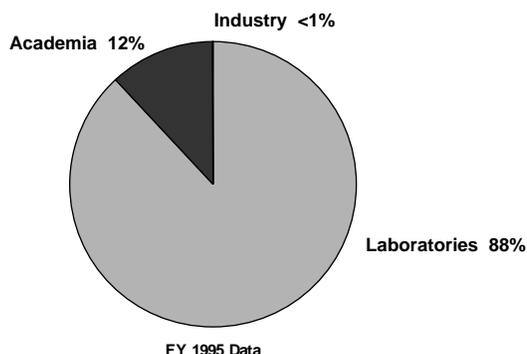
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The materials chemistry research area focuses on synthesis, processing, and characterization of polymers, organic ferromagnets, fullerene derivatives, nanocluster materials, and organic and inorganic superconductors. Each of these types of materials has the potential for profoundly advancing energy-related and other technologies. The surface chemistry component of the effort addresses corrosion, electrochemistry, and the molecular understanding and control of lubrication and friction.

Funding History

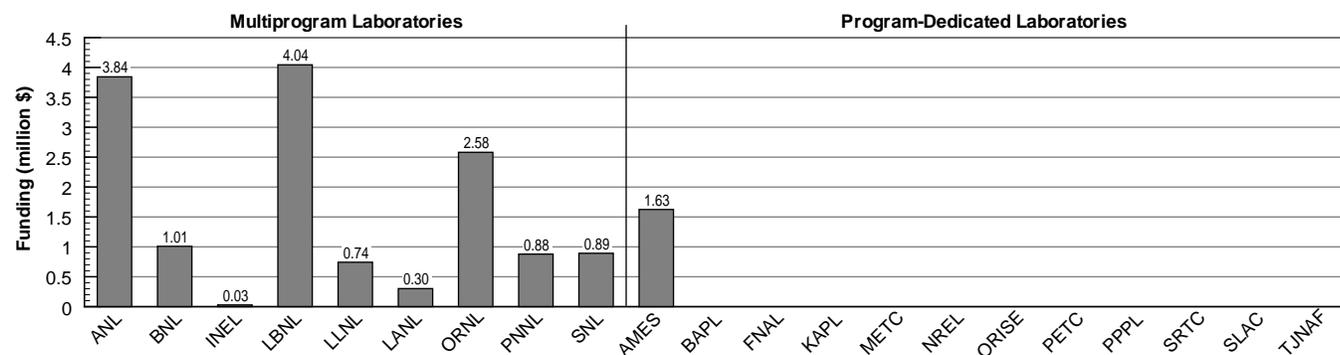


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Material Sciences.

Fiscal Year 1995 Funding Profile



Materials Sciences Facilities Operations

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Materials Sciences
B&R Code: KC0204

Laboratory Complex

Principal Laboratories: ANL
Contributing Laboratories: BNL, LBNL
Participating Laboratories: ORNL, SLAC

Mission Activity Description

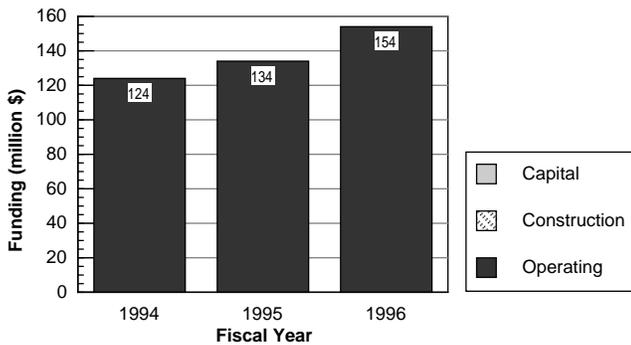
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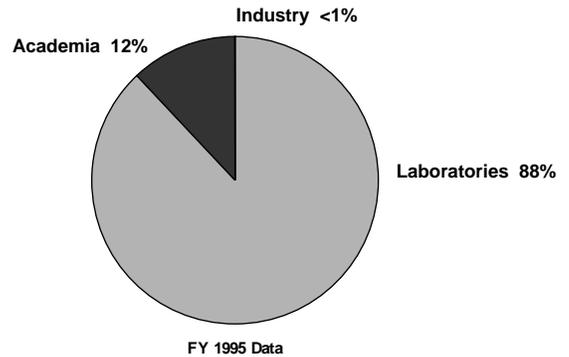
Materials Sciences supports the operation of unique facilities that are not otherwise available to the scientific community and their application to energy related materials problems.

The facilities operation area supports the major facilities used to conduct forefront research in materials and other disciplines and in the applied sciences using high fluxes of neutrons or photons. These facilities are unique in their ability to probe materials structure and properties important to energy related phenomena. Recognizing the unmatched opportunity for scientific advances, scientists from all parts of the Nation travel to these facilities to conduct their research. In 1996, final commissioning of the 6-7 GeV Synchrotron Radiation Source will take place and the operations of the Manuel Lujan, Jr., Neutron Scattering Center will be restored.

Funding History

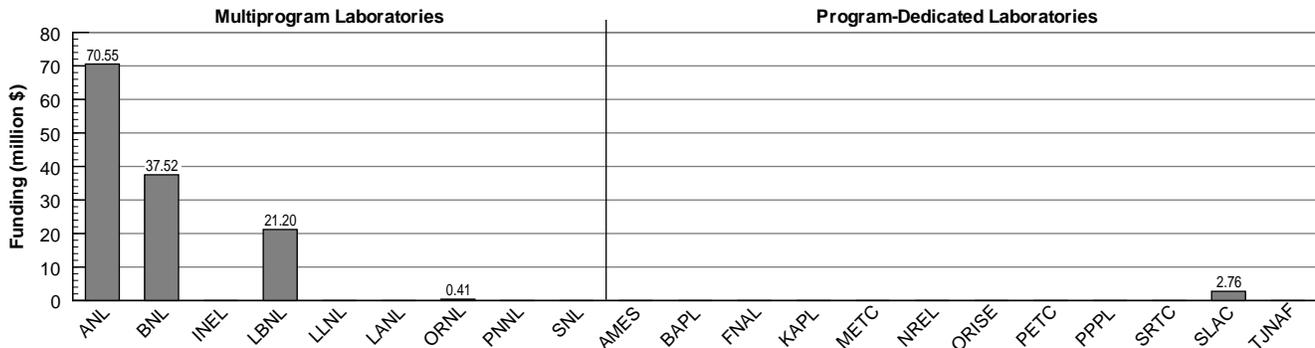


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Materials Sciences.

Fiscal Year 1995 Funding Profile



Photochemical and Radiation Sciences

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030101

Laboratory Complex

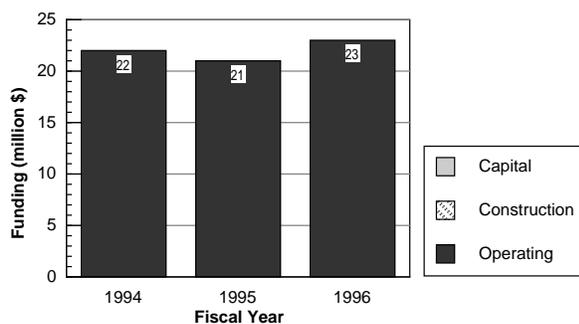
Principal Laboratories: ANL, BNL
Contributing Laboratories: NREL
Participating Laboratories: Ames, LBNL, LLNL, ORISE

Mission Activity Description

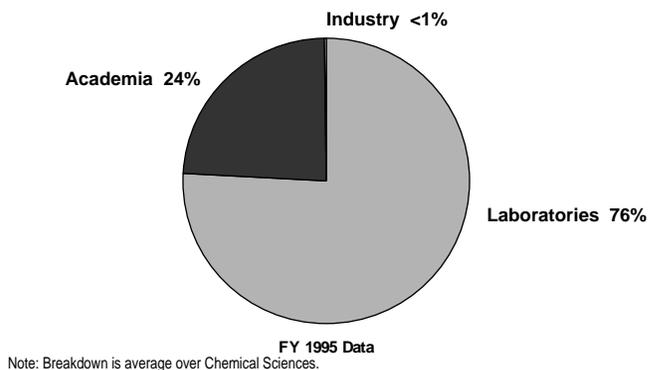
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The primary goal of the photochemical and radiation sciences area is to support basic research that will lead to improved devices for the conversion of solar radiant energy into electricity or fuels. Areas of research emphasis that contribute to this goal include the study of how natural systems, such as plants, convert solar radiant energy into high-energy-content materials and chemicals, and the characteristics of novel photovoltaic systems that are capable of converting radiant solar energy into electricity with reasonable efficiency. The results of this research are directly tied to development of sustainable technologies based on solar and renewable energy sources. In addition, the radiation sciences research program has been and continues to be invaluable for understanding how and what is occurring in complex radiant environments like those encountered in waste tanks at Hanford and elsewhere.

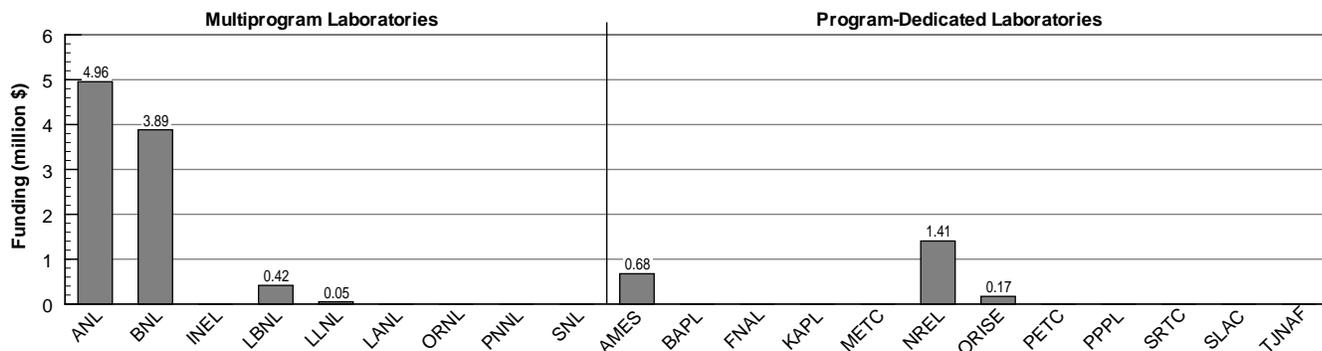
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Chemical Physics

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030102

Laboratory Complex

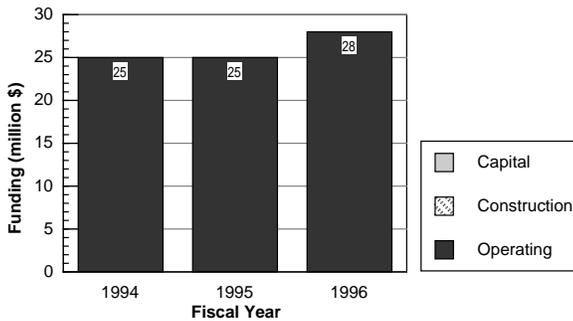
Principal Laboratories: ANL, PNNL
Contributing Laboratories: BNL, LBNL, SNL
Participating Laboratories: Ames, ORNL, LLNL

Mission Activity Description

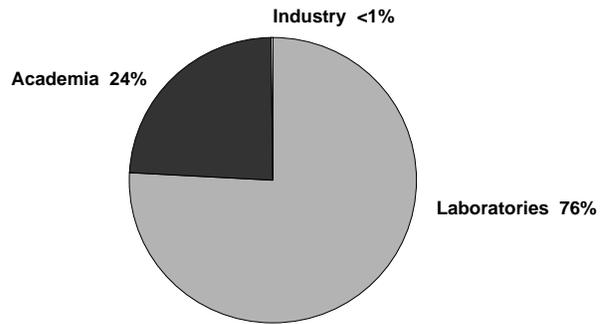
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The Chemical Physics research area focuses on combustion and catalysis related research. Combustion processes account for about 90 percent of the energy generated today. To reduce the environmental effects of combustion processes, they must be made more efficient, less polluting, and, therefore, more sustainable. Catalysts are essential to improving the selectivity and efficiency of a whole host of processes for energy conversion and storage including the production of high-energy-content materials such as gasoline and other fuels. Research focuses on developing a better understanding of the chemistry of catalytic systems. Discovery of new catalysts may determine if existing processes are sustainable and enable development of sustainable methods for utilizing existing resources.

Funding History

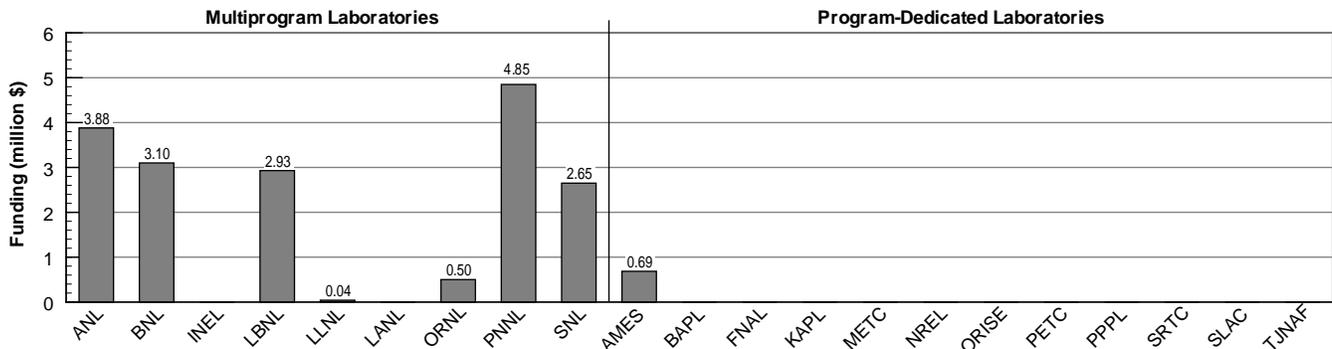


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Chemical Sciences.

Fiscal Year 1995 Funding Profile



Atomic Physics

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030103

Laboratory Complex

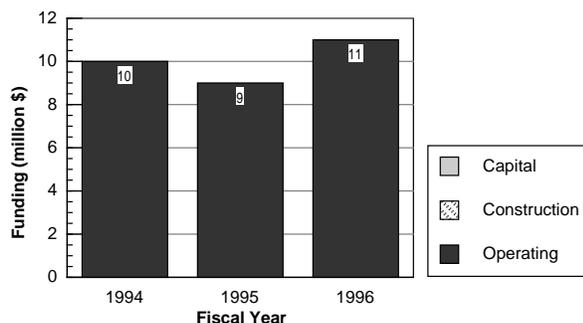
Principal Laboratories: ANL, LBNL, ORNL
Contributing Laboratories: None
Participating Laboratories: LLNL, BNL

Mission Activity Description

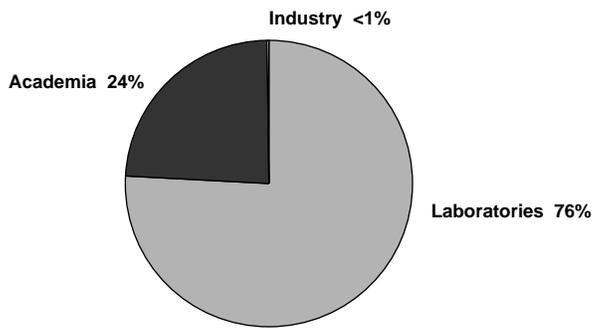
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The atomic physics research area focuses on plasmas and energetic species associated with plasmas. For example, highly ionized heavy atoms are important to the advancement of fusion concepts. The systems under study also include low-temperature plasmas relevant to a host of modern technologies including materials processing and lighting.

Funding History

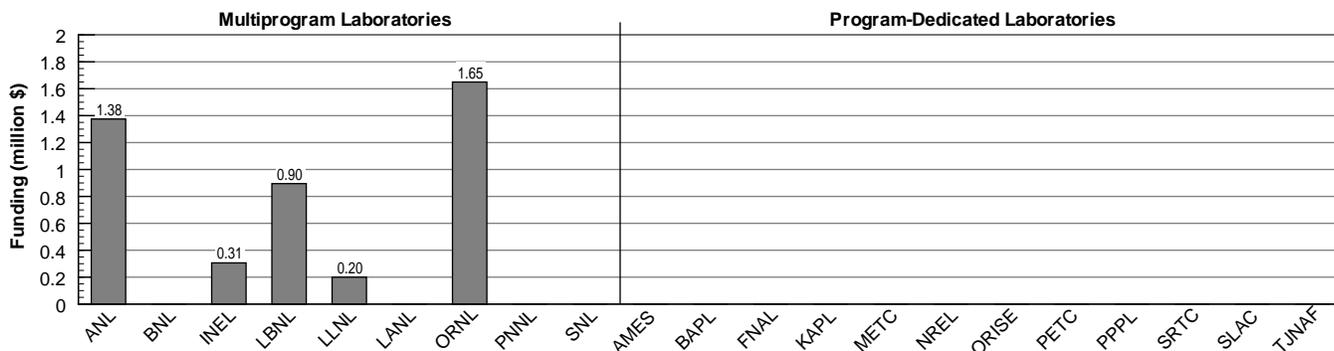


Laboratory-Academia-Industry Participation



FY 1995 Data
 Note: Breakdown is average over Chemical Sciences.

Fiscal Year 1995 Funding Profile



Chemical Sciences Facilities Operations

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030104

Laboratory Complex

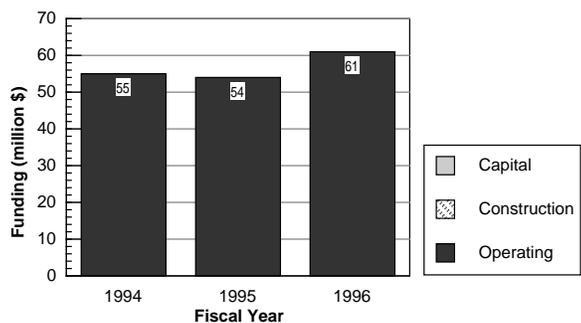
Principal Laboratories: ORNL, SLAC
Contributing Laboratories: BNL
Participating Laboratories: SNL

Mission Activity Description

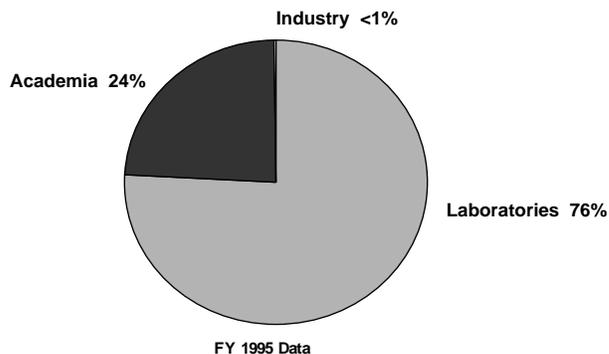
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Chemical Sciences Facilities Operations supports major user facilities which are open to all qualified researchers and offer the opportunity to explore chemical systems using instruments and capabilities available nowhere else. Such facilities include the Combustion Research Facility at Sandia, Livermore; the High Flux Isotope Reactor at Oak Ridge; and the synchrotrons at both Brookhaven and Stanford. These large instruments represent resources for the general scientific community to expand the frontiers of science by applying tools of unmatched capability.

Funding History

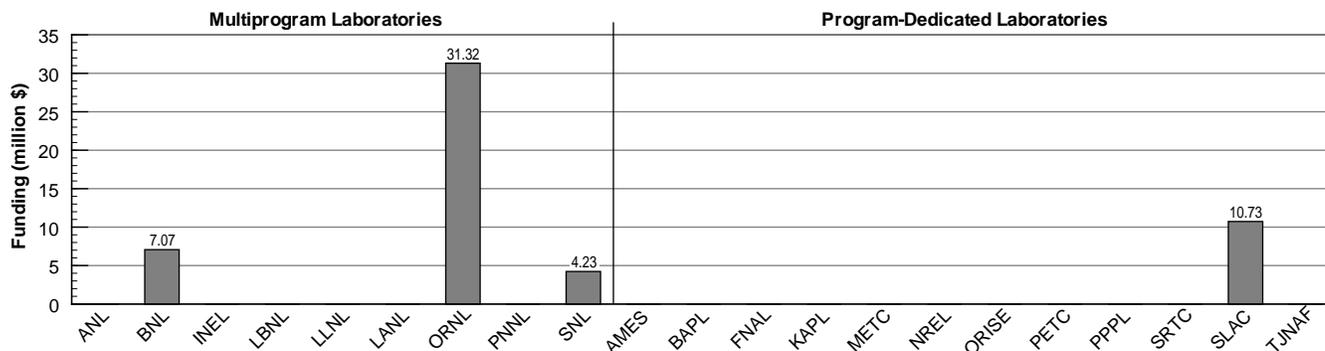


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Chemical Sciences.

Fiscal Year 1995 Funding Profile



Chemical Energy

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030201

Laboratory Complex

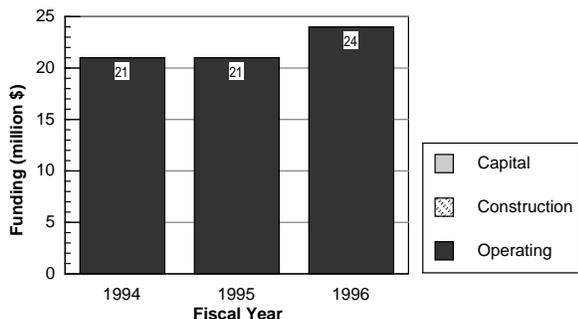
Principal Laboratories: ANL, ORNL
Contributing Laboratories: BNL
Participating Laboratories: Ames, LANL, LBNL, NREL, PETC, PNNL

Mission Activity Description

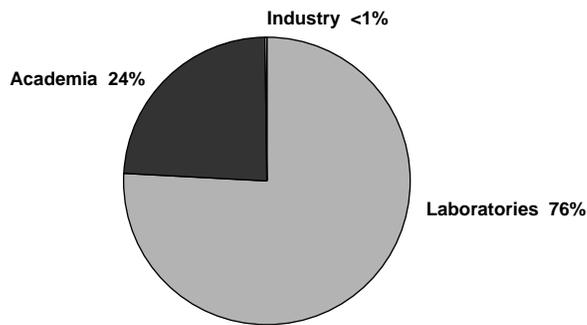
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The two main efforts under the Chemical Energy research area are the catalysis related research program and chemistry important to development of better ways to utilize carbonaceous resources such as natural gas, oil, coal and biomass. Research in catalysis is carried out on homogeneous and heterogeneous systems. As with the chemical physics program, this research seeks to better understand the effect of metals that are the basis for most catalysts that are commercially important. Studies of chemical transformations and/or conversions to new or existing concepts of energy production and storage are a prime focus.

Funding History

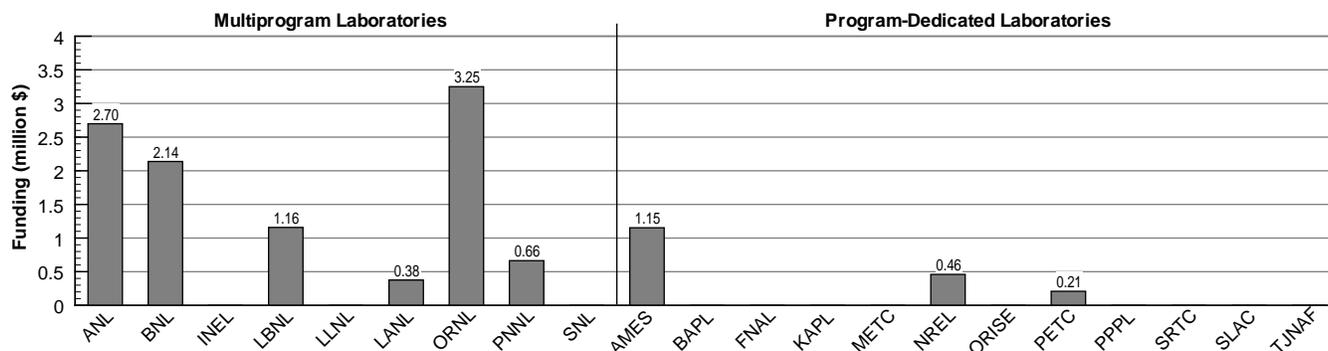


Laboratory-Academia-Industry Participation



FY 1995 Data
 Note: Breakdown is average over Chemical Sciences.

Fiscal Year 1995 Funding Profile



Chemical Separations and Analysis

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030202

Laboratory Complex

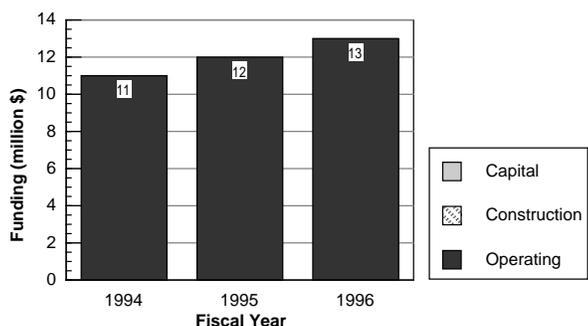
Principal Laboratories: ORNL
Contributing Laboratories: Ames, ANL, PNNL
Participating Laboratories: BNL, INEL, LBNL

Mission Activity Description

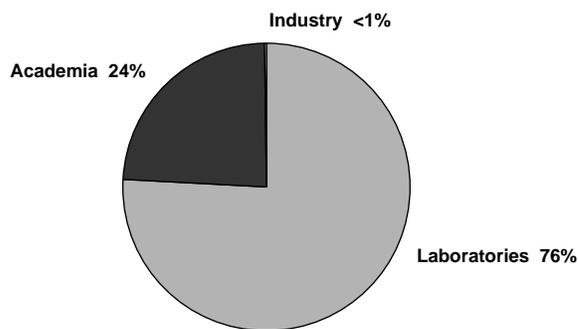
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The Separations and Analysis research area is particularly important to processes being developed for remediation of contaminated environmental systems and waste. More efficient separations processes are sought through the use of selective membranes and design of molecular systems for species-specific separations. Analytical chemistry research focuses on sensitive, reliable and species-specific ways to identify and monitor the constituents of contaminated systems and waste. The interaction between the separations science research program and DOE's Environmental Restoration and Waste Management Efficient Separations Program is one example of the importance of this program.

Funding History

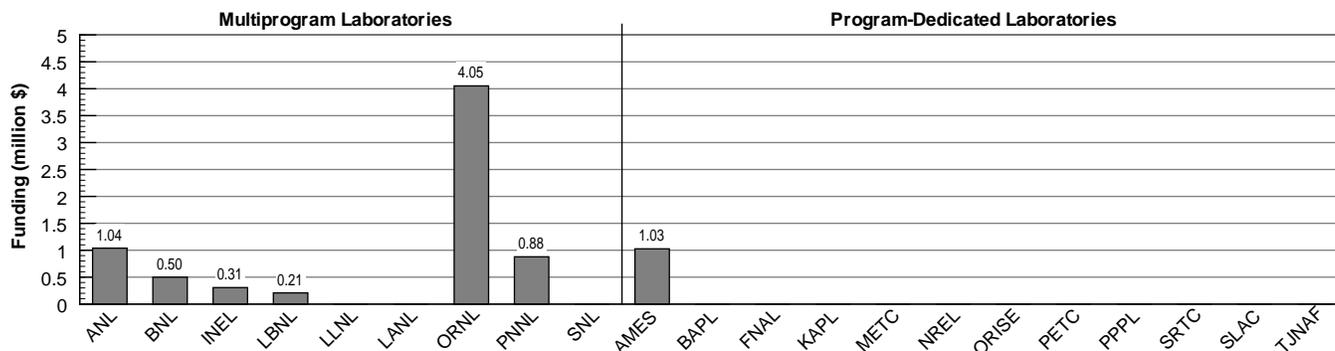


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Chemical Sciences.

Fiscal Year 1995 Funding Profile



Heavy-Element Chemistry

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030203

Laboratory Complex

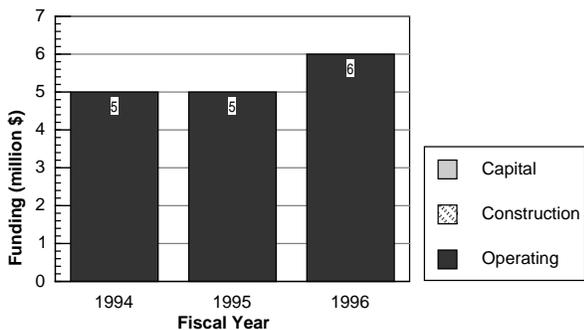
Principal Laboratories: ANL, LBNL, ORNL
Contributing Laboratories: None
Participating Laboratories: LANL

Mission Activity Description

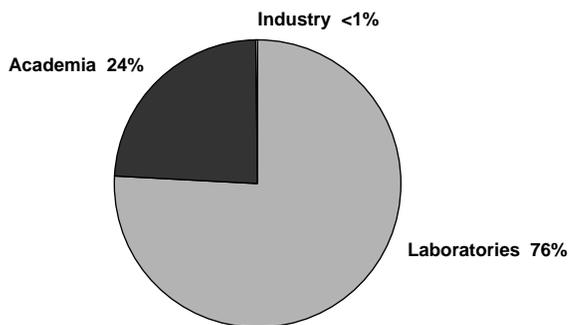
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Heavy-Element Chemistry research focuses on development of better ways to deal with radioactive materials with emphasis on understanding the chemical behavior and migration of actinide elements under environmental conditions. In particular, better ways are sought to remove heavy elements from contaminated environmental sites or radioactive wastes.

Funding History

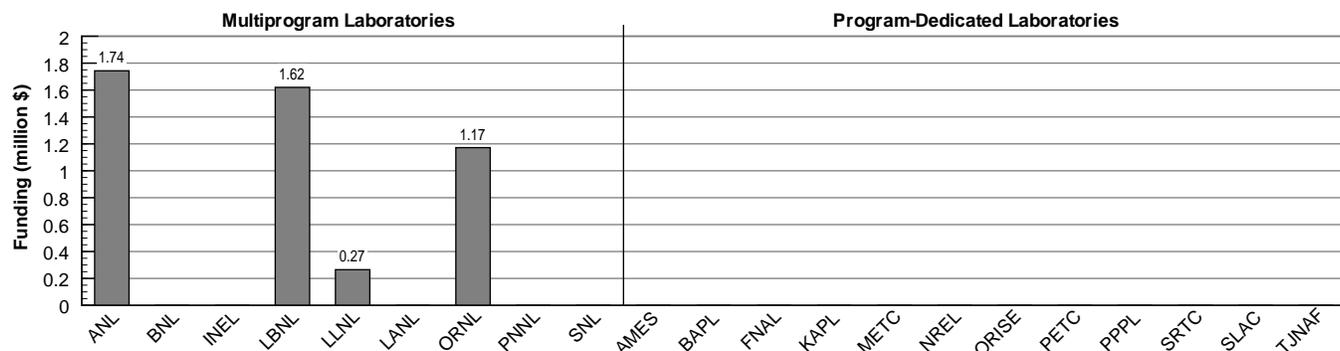


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Chemical Sciences.

Fiscal Year 1995 Funding Profile



Chemical Engineering Sciences

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Chemical Sciences
B&R Code: KC030204

Laboratory Complex

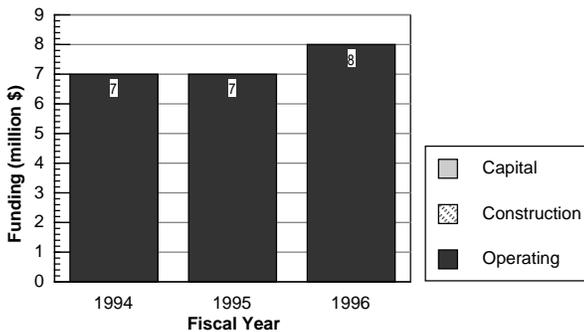
Principal Laboratories: LBNL, SNL
Contributing Laboratories: LANL
Participating Laboratories: Ames, ANL, BNL, NREL, ORNL

Mission Activity Description

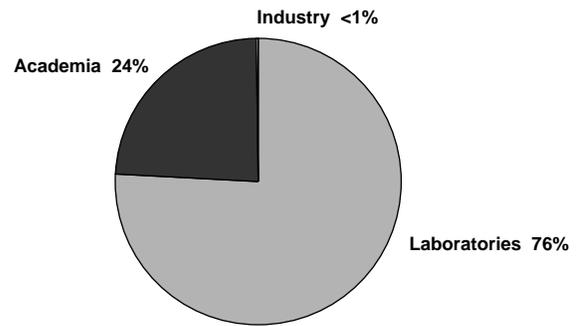
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Research in Chemical Engineering Sciences seeks to provide better and more physically realistic models for predicting the thermophysical properties and physical equilibrium of complex fluid mixtures and properties of turbulent combustion systems. The advanced battery research activity supported under this program focuses on batteries for non-automotive applications and complements the more applied program of the Office of Energy Efficiency and Renewable Energy.

Funding History

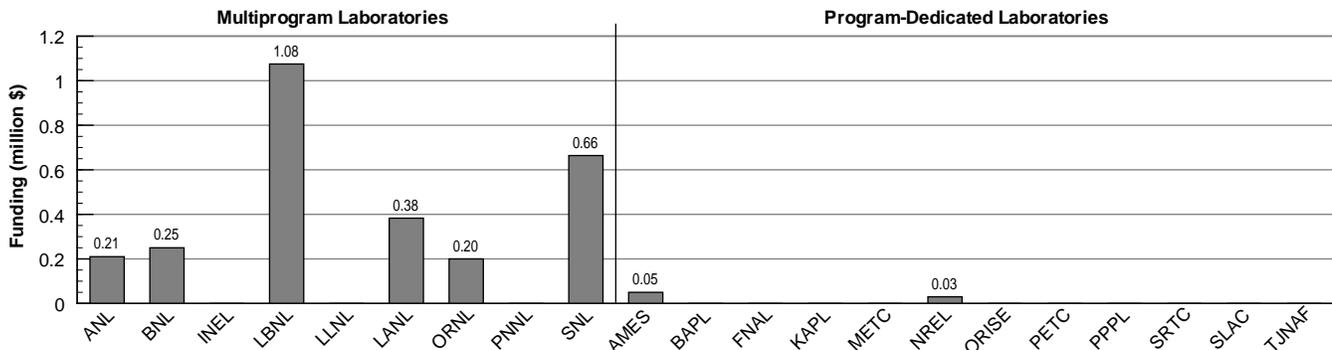


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Chemical Sciences.

Fiscal Year 1995 Funding Profile



Engineering Research

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Engineering and Geosciences
B&R Code: KC0401

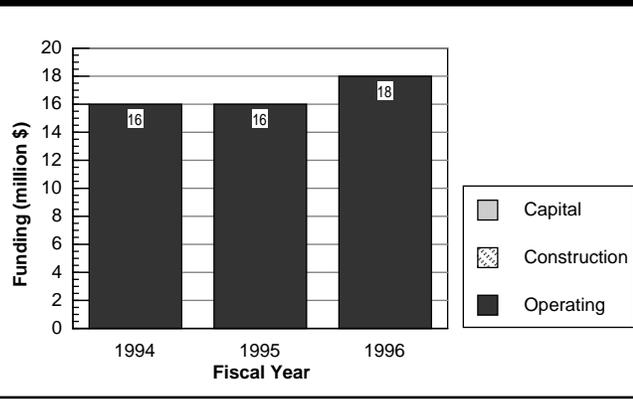
Laboratory Complex

Principal Laboratory: INEL, ORNL
Contributing Laboratories: SNL
Participating Laboratories: ANL, LANL, LBNL, LLNL, PNNL

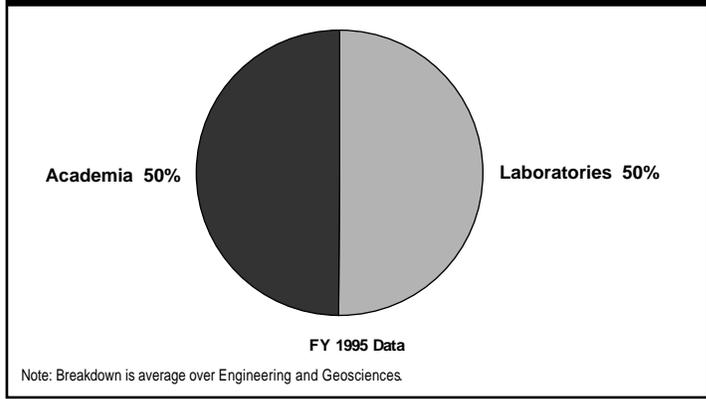
Mission Activity Description

Engineering Research serves as a conduit between basic science and applications-oriented research and development. The goal is to maintain leadership in engineering and stimulate sustainable growth. The areas of particular concern are: pollution avoidance, control, and remediation; increased energy efficiency; and assuring future energy supplies. The engineering research activity aims are (1) to improve and advance our knowledge of processes underlying current engineering practice, and (2) to expand the store of fundamental concepts for solving anticipated and unforeseen engineering problems in energy technologies. The program advances the engineering fundamentals important to increasing energy efficiency, identifying potential new sustainable energy production and utilization processes, advancing manufacturing science, and achieving higher environmental standards. Examples include such mechanical science investigations as the formation of foams and the motion of oil and gas, behavior of suspension and slurries important to industrial processes and fossil energy transport, the hydrodynamics of pollutant dispersion in the lower atmosphere, and the flow of thin liquid films in heat transfer systems. Control systems, another area of emphasis, focus on interacting autonomous systems, reconfigurable systems which can adapt to changing tasks and environments, and the interface between biology and chemical process control aiming at improving the viability of biological processes in industrial and environmental applications. In addition, thermochemical data are obtained for the separation of aqueous-hydrocarbon mixtures for industrial processes and for environmental cleanup.

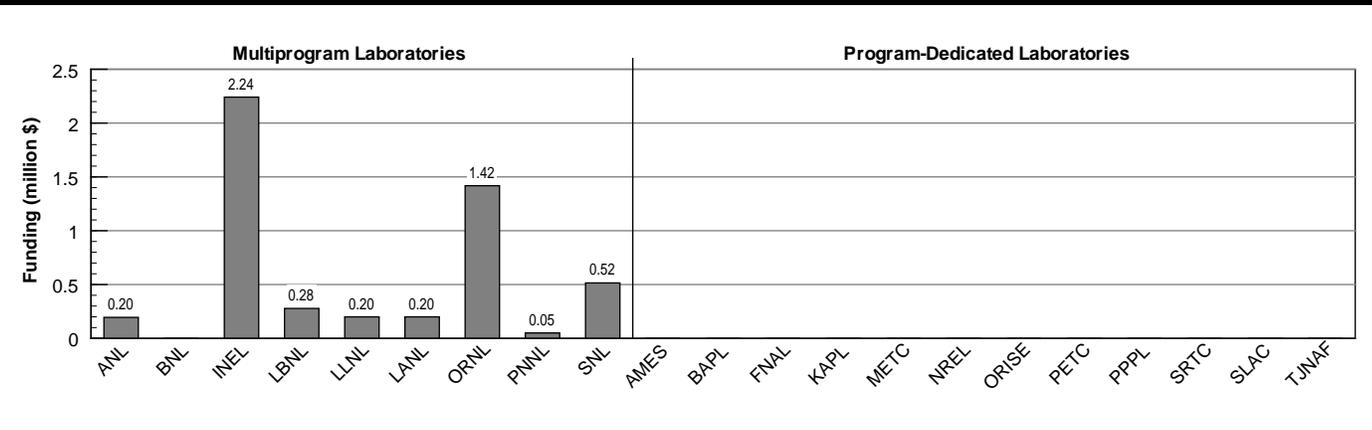
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Geosciences

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Engineering and Geosciences
B&R Code: KC0403

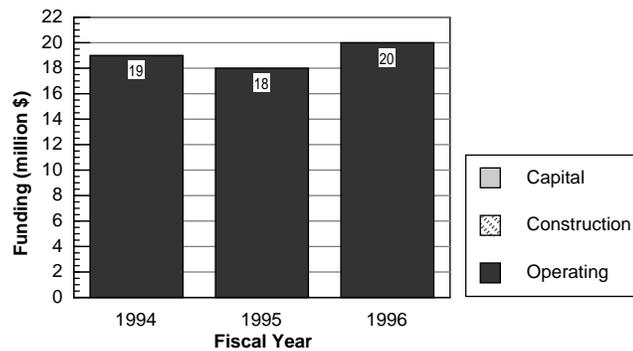
Laboratory Complex

Principal Laboratories: LANL
Contributing Laboratories: LBNL, LLNL, ORNL, SNL
Participating Laboratories: ANL, BNL, INEL, PNNL

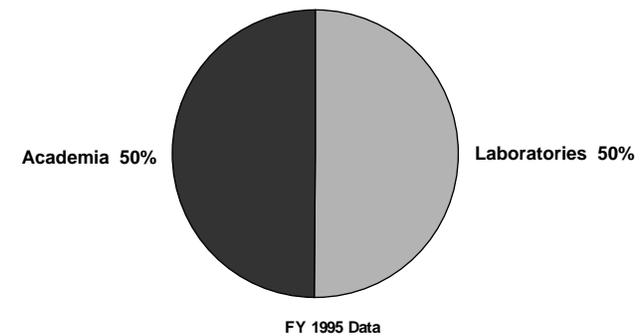
Mission Activity Description

Geosciences research provides the technical foundation for environmentally sound, efficient, and economic use of the Earth's energy resources. It also provides the scientific basis for improved and innovative environmental remediation technologies. Programmatic emphasis is on natural and contaminated fluids flowing in, and interacting with, porous and fractured geologic media. Underlying principles and phenomena are applicable to: improved recovery of energy resources, remediation of contaminated sites and design of waste repositories. More specifically, the study of mineral-fluid interactions develops information obtained at the atomistic scale to address larger scale problems such as waste migration. Geophysical imaging using seismic and electromagnetic geophysical methods are used to obtain information on subsurface structure, discontinuities, and physical properties. Particular emphasis is placed on fluid (geothermal, oil, gas, contaminated groundwater) bearing reservoirs. There is a continuing need for high quality fundamental physical, mechanical, thermodynamic, kinetic, and transport data on rocks, minerals and geologic fluids to model and predict the response of the geologic system to natural and anthropogenic perturbations.

Funding History

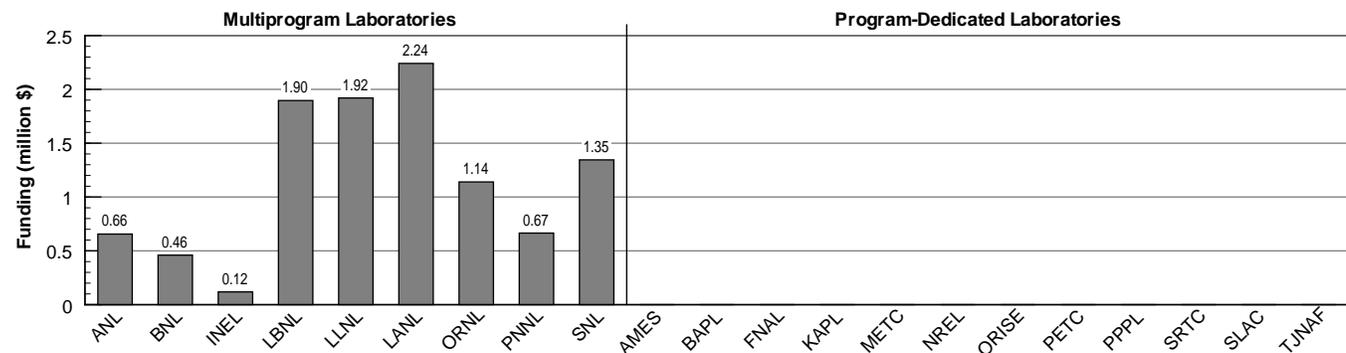


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Engineering and Geosciences.

Fiscal Year 1995 Funding Profile



Exploratory Energy Concepts

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Advanced Energy Projects
B&R Code: KC0501

Laboratory Complex

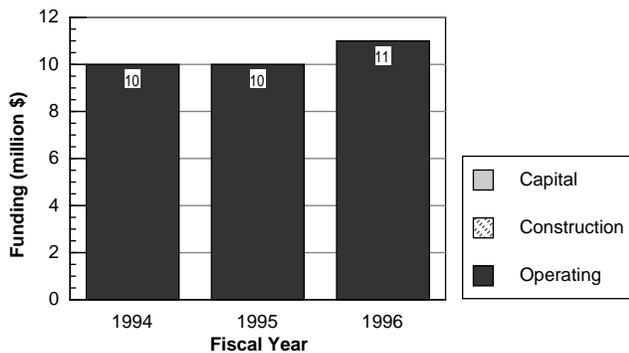
Principal Laboratories: LLNL, NREL
Contributing Laboratories: LANL, LBNL, SNL
Participating Laboratories: Ames, ANL

Mission Activity Description

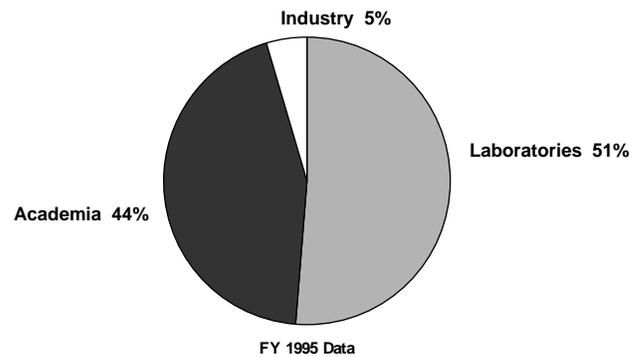
Advanced Energy Projects explores the feasibility of novel, energy-related concepts that evolve from advances in basic research. Supported projects typically are at an early stage of scientific development and, therefore, are premature for consideration by applied research or technology development programs. These projects often involve high-risk, exploratory concepts that do not readily fit into existing DOE program areas but that have the potential for high payoff in energy-related applications, sometimes spanning scientific or technical disciplines. Following support from this program, it is expected that the successful concept will be sufficiently developed and promising to attract further funding from other sources in order to realize its full potential.

The portfolio of projects is dynamic, but reflects the broad role of the Department of Energy in supporting research and development for improving the Nation's energy posture. Topical areas currently receiving support are novel materials for energy technology, renewable and biodegradable materials, exploring uses of new scientific discoveries, alternate pathways to energy efficiency, alternative energy sources, and innovative approaches to waste treatment and reduction.

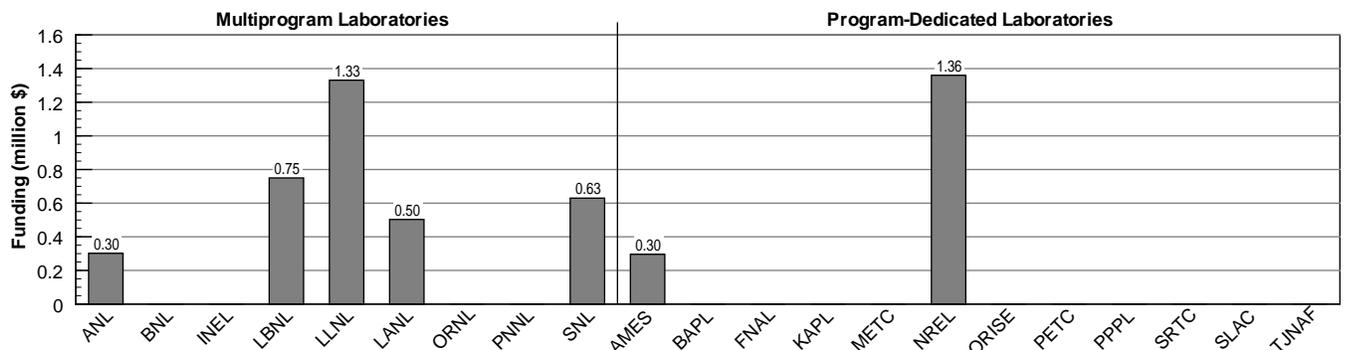
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Energy Biosciences

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Energy Biosciences
B&R Code: KC06

Laboratory Complex

Principal Laboratories: BNL, LBNL
Contributing Laboratories: None
Participating Laboratories: NREL, LANL

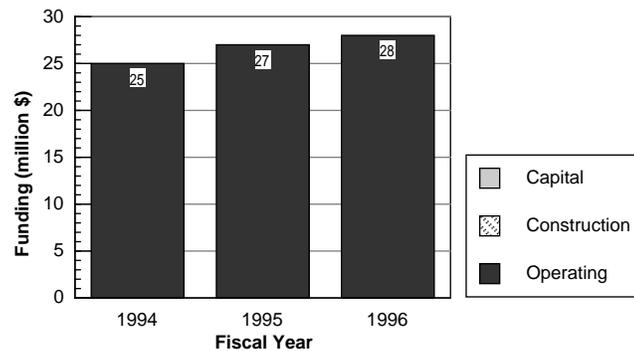
Mission Activity Description

The mission of Energy Biosciences is to support biological research which generates the basic knowledge necessary to develop and use new and existing energy resources in an environmentally sound manner. Research in the disciplines of plant science and microbiology capitalizes on the capability of plants and microbes, either alone or combined, to harvest solar energy and convert it into potential fuels, materials and chemical feedstocks. Plants and microbes (including their component parts) can also improve energy efficiency in an industrial setting and provide environmental benefits.

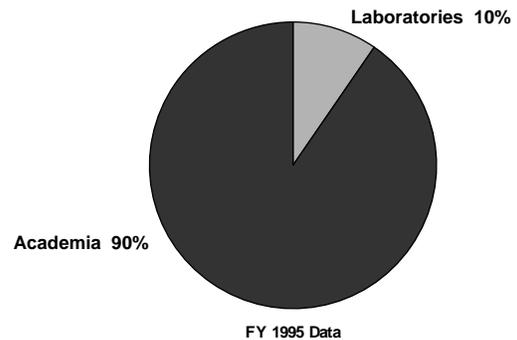
Specific examples of Energy Biosciences research areas are described below.

- (1) Research increasing our knowledge of the genetics, metabolism, physiology, development and regulation in plants to permit use of these organisms in an energy and environmental context. Of particular importance is the formation and function of plant cell walls, the major component of biomass.
- (2) Research designed to fully comprehend the process of photosynthesis is supported including the capture of solar energy, the release of molecular oxygen and the fixation of carbon dioxide into energy rich compounds.
- (3) Research to explore the mechanisms of fermentation conversions. Fermentative microorganisms are capable of readily converting large amounts of bioproducts such as cellulose and lignin into a wide variety of potential fuels and chemical feedstocks.
- (4) Research on organisms from extreme environments such as high temperature provide knowledge of the breadth of biological systems which is important in developing a framework for the adaptation of biological systems into industrial processes. Biological systems with diverse metabolic capabilities are of interest in both an environmental and energy context.

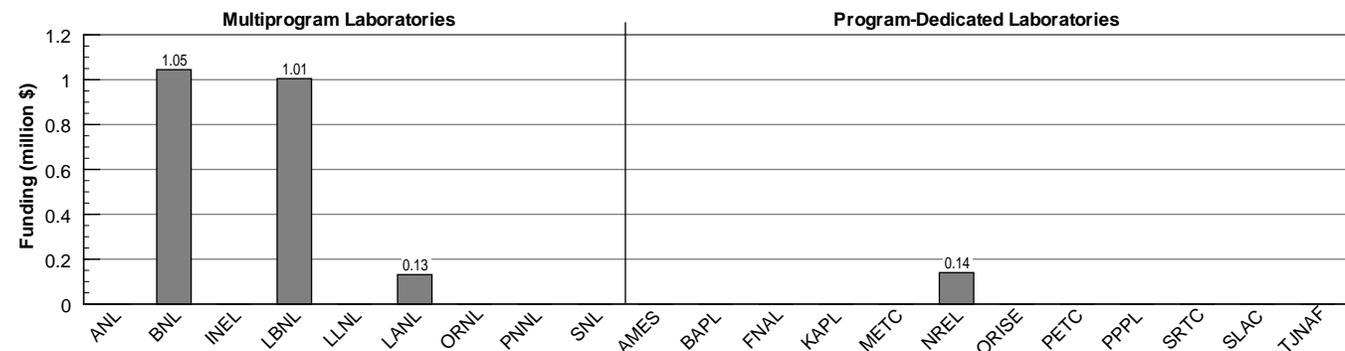
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Applied Mathematical Sciences

Department of Energy Program

Program: Energy Research
Office: Basic Energy Sciences
Element: Applied Mathematical Sciences
B&R Code: KC0701, KC0702

Laboratory Complex

Principal Laboratories: LLNL
Contributing Laboratories: ANL, LANL, ORNL
Participating Laboratories: Ames, BNL, FNAL, INEL, LBNL, PNNL, SNL, TJNAF

Mission Activity Description

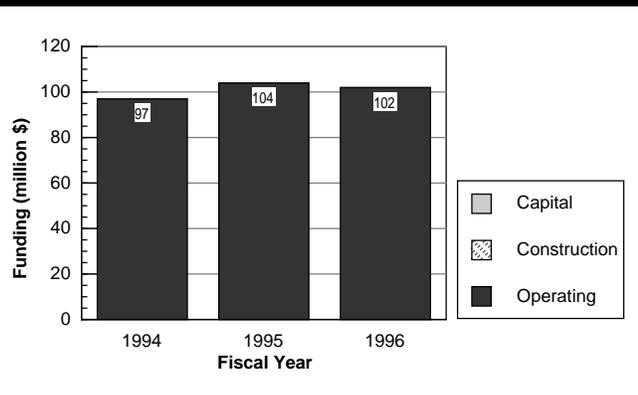
The **Applied Mathematical Sciences** research area program is a forefront, diverse applied mathematical sciences, high performance computing, communications and information infrastructure program. It spans the spectrum of activities from strategic fundamental research to technology development and demonstration. The diverse activities supported by this program are integrated to support two major strategic thrusts:

- National Collaboratories—Develops a set of tools and capabilities to permit scientists and engineers working at different DOE and other facilities to collaborate on solving problems as easily as if they were in the same building.
- Advanced Computational Testing and Simulation—Develops an integrated set of algorithms, software tools and infrastructure which enable computer simulation to be used in place of experiments when real experiments are too dangerous, expensive, inaccessible, or politically infeasible.

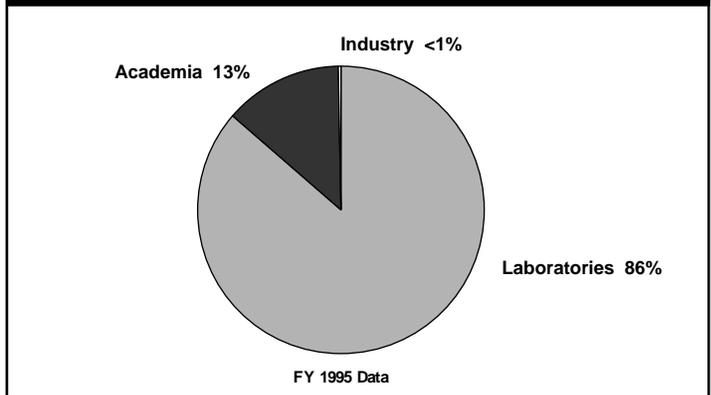
These two strategic thrusts support the underlying mathematical concepts and information technology needs of all Department of Energy (DOE) program areas (defense, energy efficiency, environmental, fossil, and so forth), and the efforts in these areas are closely coordinated with related activities supported by Defense Programs.

The program also supports and responds to the Energy Policy Act (EPACT) and to the High Performance Computing Act of 1991 (also known as the Gore Bill) and provides supercomputer access and advanced communication capabilities (through the Esnet computer network) to scientific researchers. Finally, the program also serves as an advocate within the Department to formulate and coordinate the Department's National Information Infrastructure initiative, especially to promote economically beneficial energy-related 'National Challenges' applications such as energy demand and supply management and to develop the underlying technologies to enable these applications.

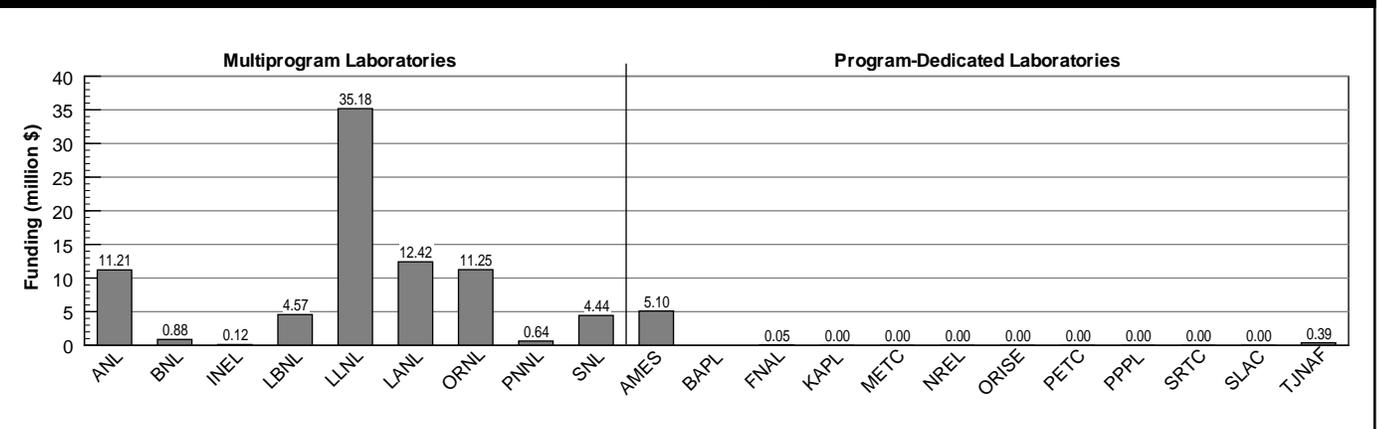
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Dosimetry Research

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Analytical Technology
B&R Code: KP0101

Laboratory Complex

Principal Laboratories: None
Contributing Laboratories: None
Participating Laboratories: LBNL, ORNL, PNNL

Mission Activity Description

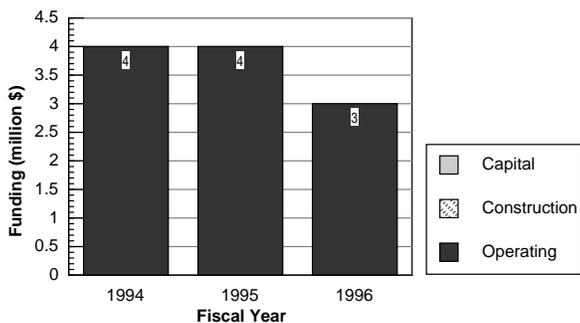
The Biological and Environmental Research (BER) program develops the knowledge needed to identify, understand, and anticipate the long-term health and environmental consequences of energy use and development through its support of peer-reviewed and competitively awarded research at national laboratories and academic institutions. The BER program uses this scientific knowledge to develop technology that can be used to mitigate or correct adverse consequences of energy use and to underpin policy and regulatory development.

Dosimetry and instrumentation research produces the advanced technology required for improved health protection practices and for an enhanced measurement capability that undergirds experimental health, biological, and environmental studies. The analytical technology subprogram involves dosimetry research and measurement science programs.

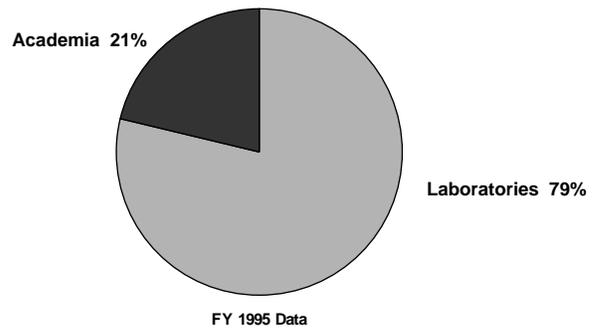
Radiation Dosimetry Research will provide an improved capability for the determination of human exposure to ionizing radiation and to environmental radon which in turn will lead to the enhanced protection of radiation workers and the general population, and a firmer basis for the evaluation of human health risk and for the development of radiation protection guidelines.

The radiation dosimetry program supports research in the field of radiation instrumentation and methodologies for measurement of radiation dose due to low linear energy transfer (LET) radiation (such as electrons, x-rays, and gamma rays) and high LET radiation (such as neutrons, alpha particles, and heavy ions). Increased emphasis is being placed on dosimetry of mixed low and high LET radiation fields since most of the radiation fields to which workers and the public may be exposed comprise such mixtures. A major concentration in the program is on the measurement of radon and its progeny in the natural indoor environment. The instruments and methodologies developed in this program will be useful for personnel and environmental monitoring.

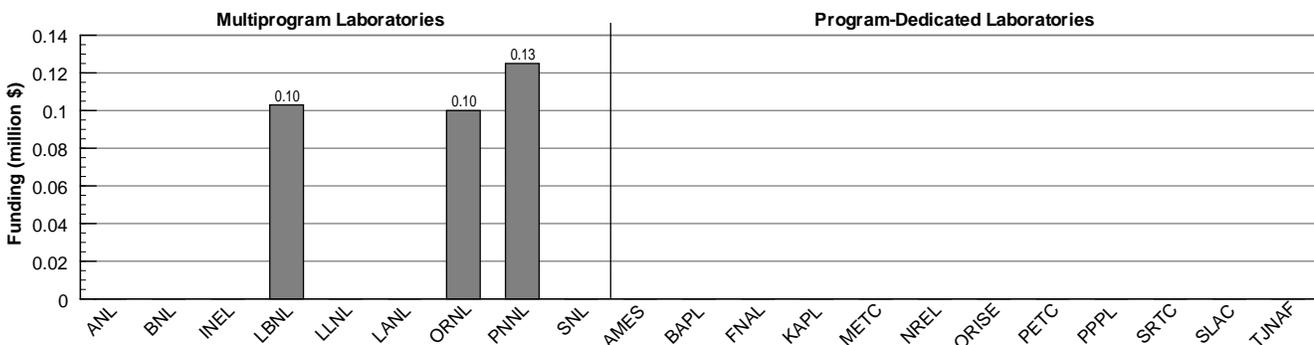
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Measurement Science

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Analytical Technology
B&R Code: KP0102

Laboratory Complex

Principal Laboratories: None
Contributing Laboratories: ORNL
Participating Laboratories: Ames, ANL, BNL, INEL, LBNL, LLNL, PNNL

Mission Activity Description

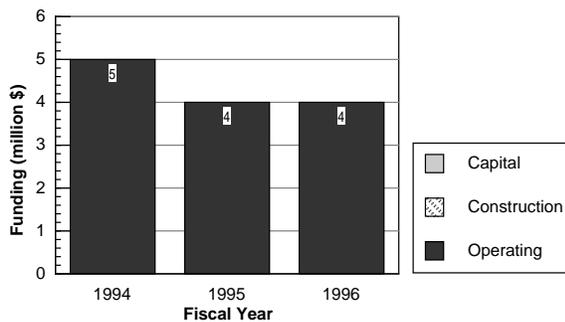
The Biological and Environmental Research (BER) program develops the knowledge needed to identify, understand, and anticipate the long-term health and environmental consequences of energy use and development through its support of peer-reviewed and competitively awarded research at national laboratories and academic institutions. The BER program uses this scientific knowledge to develop technology that can be used to mitigate or correct adverse consequences of energy use and to underpin policy and regulatory development.

Dosimetry and instrumentation research produce the advanced technology required for improved health protection practices and for an enhanced measurement capability that undergirds experimental health, biological, and environmental studies.

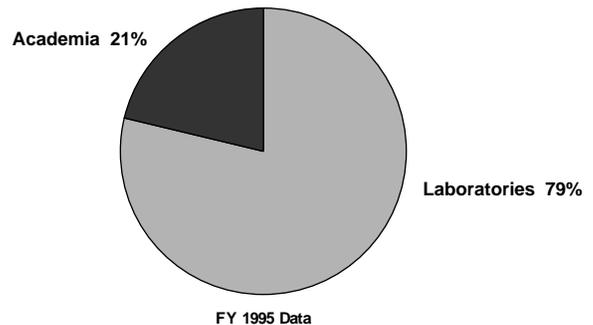
Measurement Science will provide new technology for chemical characterization of biological systems with high spatial and temporal resolution in support of the health effects program, and for study of ocean and subsurface environments, including mixed hazardous wastes, in support of the environmental sciences program. In addition to providing an advanced instrumentation capability for the health, biological, and environmental research programs, these new measurement technologies are transferred to the private sector for commercial application with the resultant benefit to the U.S. economy of increased international competitiveness.

The measurement science program supports research in analytical chemistry directed at meeting the needs for new measurement technology for the missions of the Office of Health and Environmental Research in the environmental and life sciences. The program has funded development of optical spectroscopy (notably resonance ionization spectroscopy), sensors for remote monitoring, and imaging technologies. This program was recompleted in fiscal year 1995 to emphasize oceanographic measurement technologies for the Global Climate Program, characterization of contaminated subsurface environments, cellular and subcellular imaging, and sensors.

Funding History

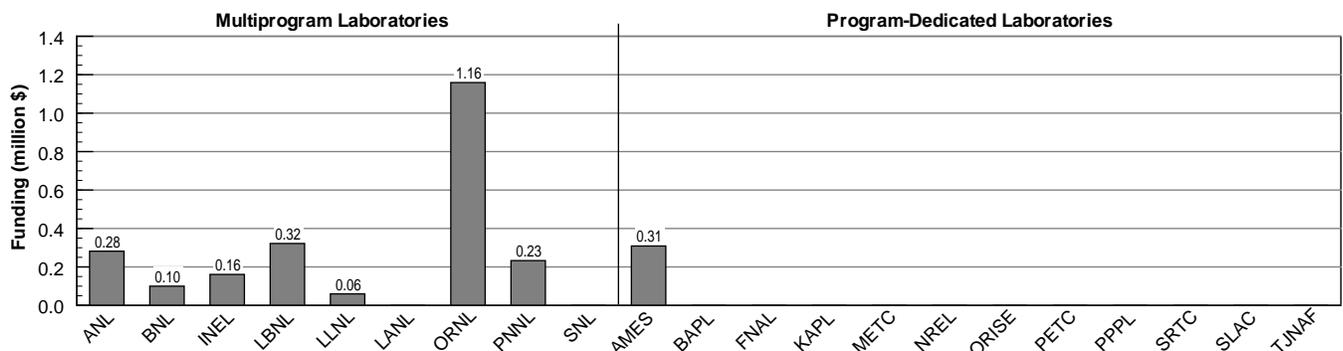


Laboratory-Academia-Industry Participation



Note: Includes EML in laboratory partition. The breakdown is average over Analytical Technology.

Fiscal Year 1995 Funding Profile



Atmospheric Science

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Environmental Research
B&R Code: KP0201

Laboratory Complex

Principal Laboratories: PNNL, BNL
Contributing Laboratories: ANL
Participating Laboratories: LANL, LBNL, LLNL, ORNL

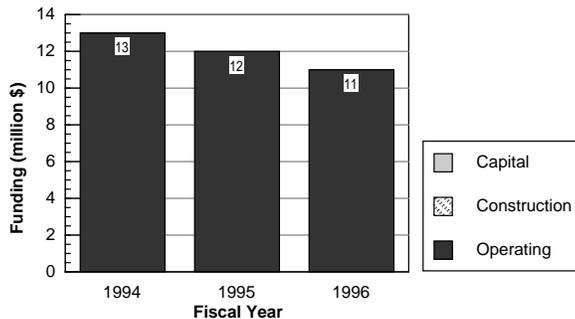
Mission Activity Description

Emissions and disturbances from energy sources have impacts at scales from local to worldwide. Environmental research is intended to improve the predictive understanding of the potential environmental consequences of energy production and use, and to identify and quantify energy-related environmental tradeoffs or constraints that may limit or impede sustainable development. This program addresses the transport of emissions and their behavior through the atmosphere, oceans, solid earth, and ecosystems at differing spatial scales and time sequences. The program is tied to the goal of sustainable development through increased understanding of the fate of pollutants and the ability to remediate or restore existing or future sites.

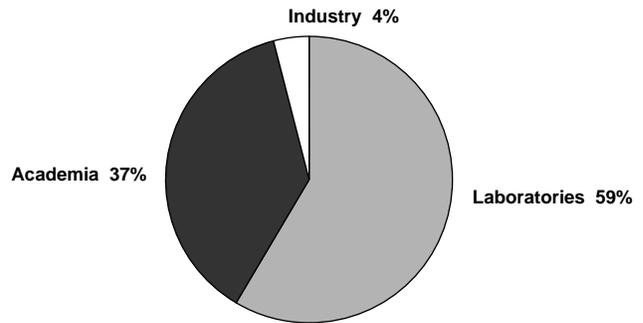
The Atmospheric Science program has two components. The first is atmospheric chemistry and addresses the processes that control tropospheric and stratospheric ozone and aerosol formation. Fine aerosols are a continuing scientific issue and current controversy in global environmental change and human health. Reduced emphasis will be placed with the second component, which explores transport and diffusion over complex terrain with the goal of enhancing the emergency preparedness and response systems at critical DOE sites.

Atmospheric chemistry research focuses on tropospheric and stratospheric ozone and fine aerosols to strengthen regional, continental, and global models.

Funding History

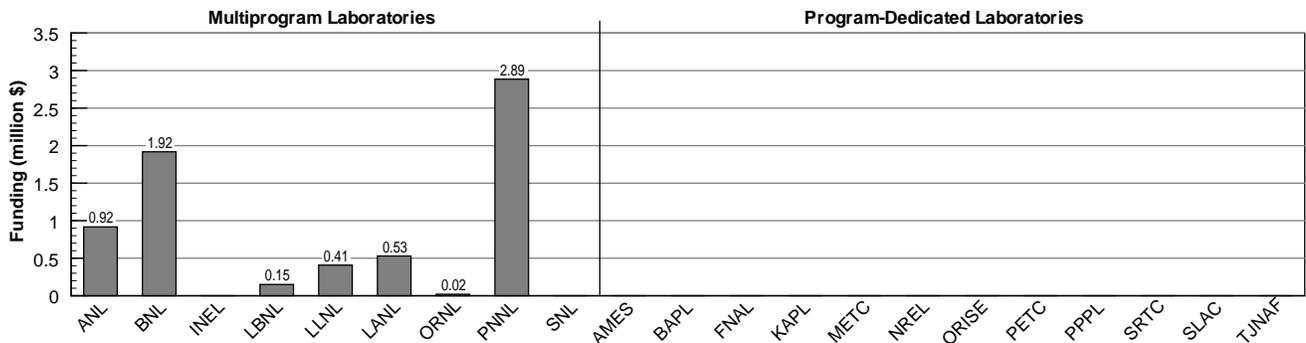


Laboratory-Academia-Industry Participation



FY 1995 Data
 Note: Breakdown is average over Environmental Research.

Fiscal Year 1995 Funding Profile



Marine Transport

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Environmental Research
B&R Code: KP0201

Laboratory Complex

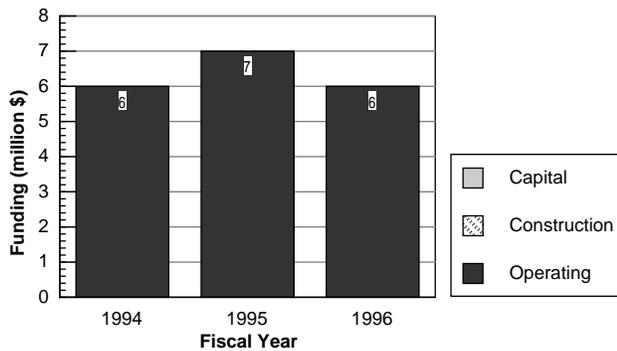
Principal Laboratories: BNL
Contributing Laboratories: None
Participating Laboratories: ORISE

Mission Activity Description

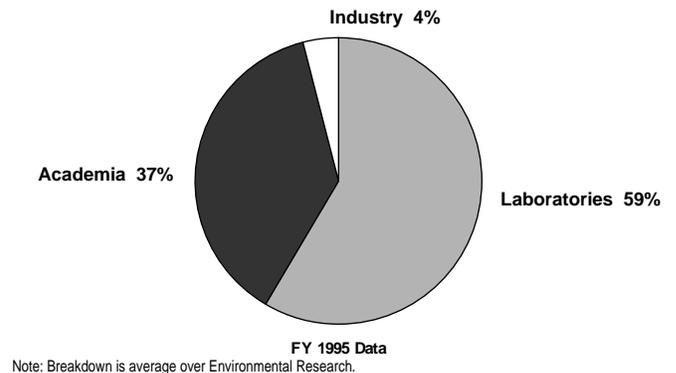
Emissions and disturbances from energy sources have impacts at scales from local to worldwide. Environmental research is intended to improve the predictive understanding of the potential environmental consequences of energy production and use, and to identify and quantify energy-related environmental tradeoffs or constraints that may limit or impede sustainable development. This program addresses the transport of emissions and their behavior through the atmosphere, oceans, solid earth, and ecosystems at differing spatial scales and time sequences. The program is tied to the goal of sustainable development through increased understanding of the fate of pollutants and the ability to remediate or restore existing or future sites.

Marine Transport research investigates the exchange of energy-related and natural materials between the continental shelf and the open ocean. Close collaboration with other programs conducting open-ocean and near-shore research helps in understanding the dynamics of the ocean margins and its influence on both land and open-ocean systems, particularly from the viewpoint of energy discharges and their assimilation into the ocean. With as much as half of the productivity of the ocean located along the ocean margins, this program is also providing important information on carbon flux and may hold the key to a significant part of the missing component of the worldwide carbon budget.

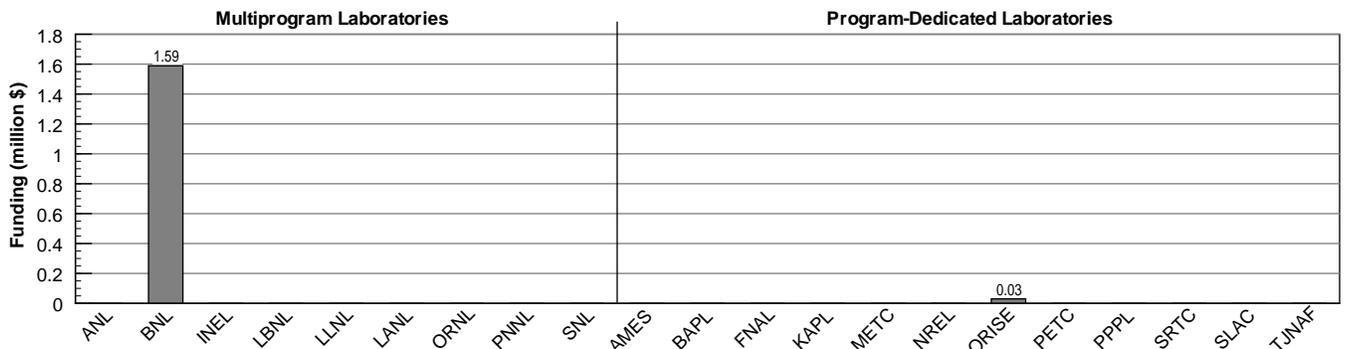
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Terrestrial Transport

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Environmental Research
B&R Code: KP0203

Laboratory Complex

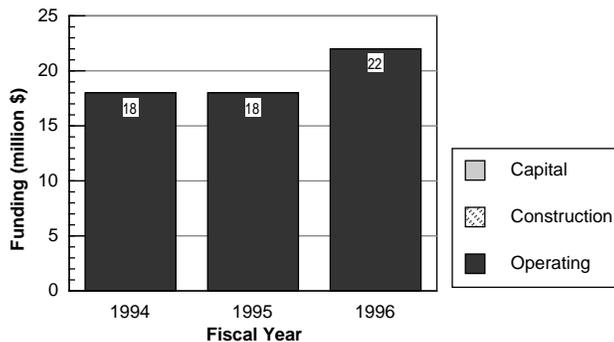
Principal Laboratories: PNNL
Contributing Laboratories: ORNL
Participating Laboratories: ANL, BNL, INEL, LANL, LBNL, ORISE

Mission Activity Description

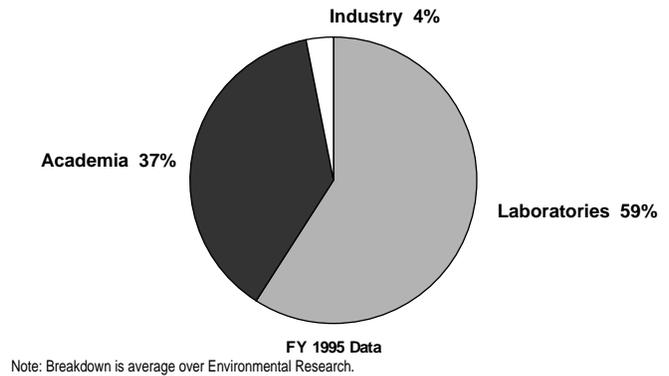
Emissions and disturbances from energy sources have impacts at scales from local to worldwide. Environmental research is intended to improve the predictive understanding of the potential environmental consequences of energy production and use, and to identify and quantify energy-related environmental tradeoffs or constraints that may limit or impede sustainable development. This program addresses the transport of emissions and their behavior through the atmosphere, oceans, solid earth, and ecosystems at differing spatial scales and time sequences. The program is tied to the goal of sustainable development through increased understanding of the fate of pollutants and the ability to remediate or restore existing or future sites.

The Terrestrial Transport program includes subsurface science research on sediments and groundwater systems, on microbial communities in deep sediments and aquifers, and on the mechanisms that control the mobility of organic-radionuclide complexes. The research addresses the fundamental physical, chemical, and microbiological mechanisms that control reactivity, stability, and transport of chemical mixtures, as well as hydrogeological and geochemical factors that control the presence, distribution, and origins of microbial communities in deep geological systems. Research on microbial origins includes studies of what may be ancient microbial communities that have evolved in situ and communities that have been transported at various times to the deep subsurface. DOE deep microbiological research has gained international recognition, and new microorganisms have been discovered at great depths. Research is also conducted on bacterial transport processes, leading to bioremediation and to the assessment of the risks associated with release of genetically engineered microorganisms (GEMs).

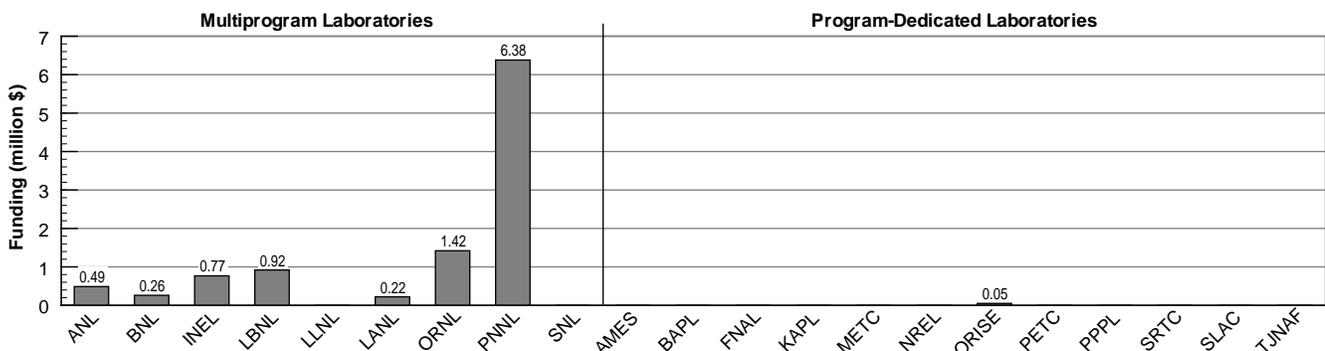
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Ecosystem Functioning and Response

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Environmental Research
B&R Code: KP0204

Laboratory Complex

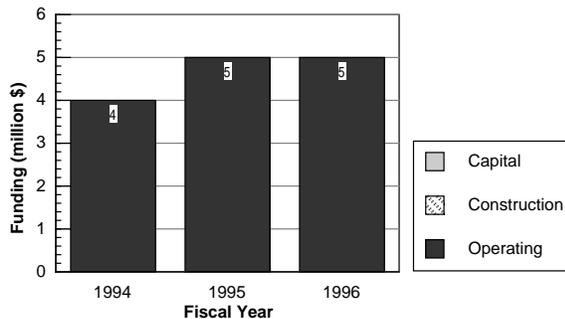
Principal Laboratories: ORNL
Contributing Laboratories: ANL
Participating Laboratories: BNL, INEL, LANL, LLNL, PNNL

Mission Activity Description

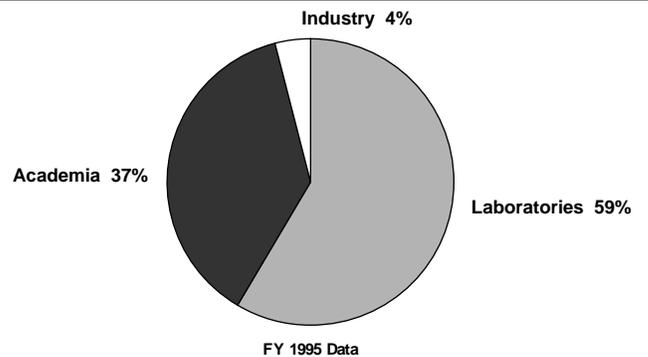
Emissions and disturbances from energy sources have impacts at scales from local to worldwide. Environmental research is intended to improve the predictive understanding of the potential environmental consequences of energy production and use, and to identify and quantify energy-related environmental tradeoffs or constraints that may limit or impede sustainable development. This program addresses the transport of emissions and their behavior through the atmosphere, oceans, solid earth, and ecosystems at differing spatial scales and time sequences. The program is tied to the goal of sustainable development through increased understanding of the fate of pollutants and the ability to remediate or restore existing or future sites.

Research on Ecosystem Functioning and Response is focused in the Program for Ecosystem Research (PER) to provide knowledge of biological adjustment and impact caused by global change and to develop an understanding of the mechanisms controlling them. This knowledge will assist DOE in resolving its environmental problems and provide a biological basis for making ecological risk and injury assessments. The theoretical, modeling, and field/laboratory experiments will be integrated in multidisciplinary research projects that are coordinated through the DOE Environmental Research Parks.

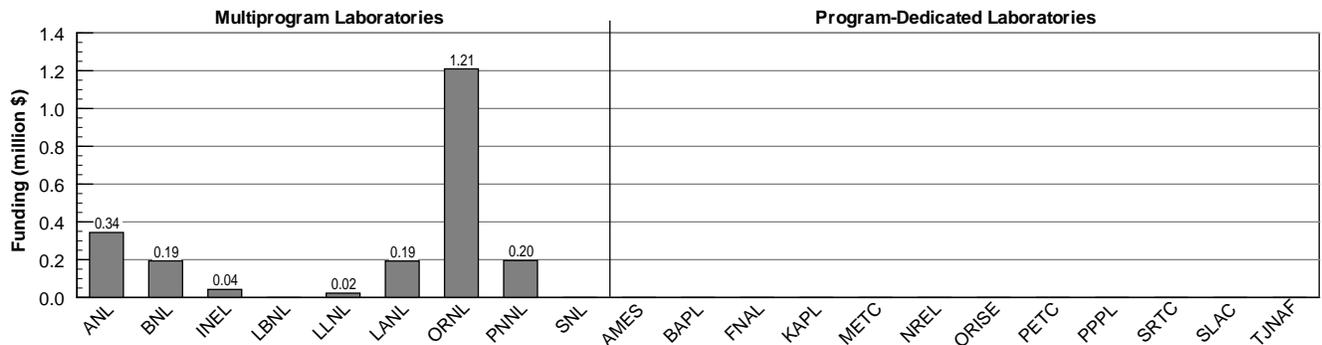
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Biological Research

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Health Effects
B&R Code: KP0302

Laboratory Complex

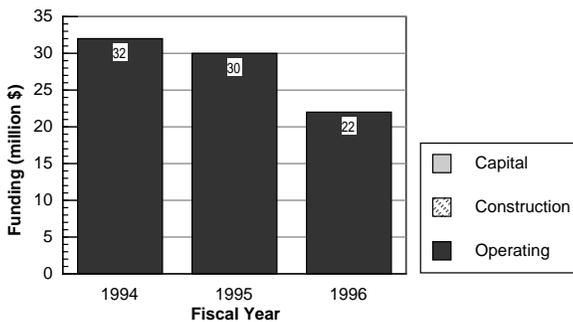
Principal Laboratory: None
Contributing Laboratories: ANL, LBNL, ORNL, PNNL
Participating Laboratories: BNL, LANL, LLNL, ORISE

Mission Activity Description

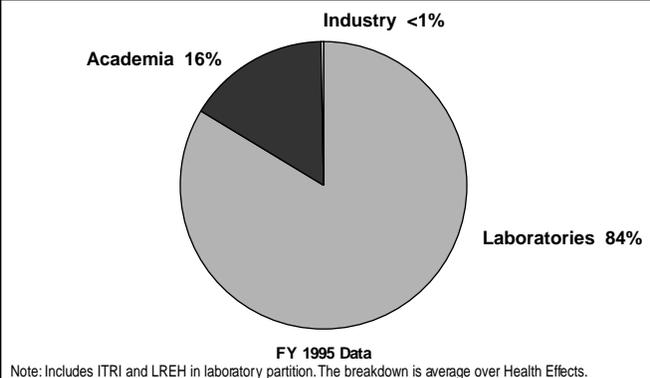
The Health Effects Research Program develops biological information and advanced technologies relevant to understanding and mitigating the potential health effects of energy development, energy use, and waste cleanup. The thrust of this program is to improve our abilities to estimate the type and magnitude of human health risk that result from low-level exposures to energy-related agents. Such agents include radiation and chemicals both at home (for example, radon) and at work (for example, waste site cleanup). Factors affecting susceptibility to exposure or disease vary from one individual to another and may, therefore, significantly alter the health impacts of low-level exposures to some individuals more than to others. The Health Effects program conducts research to develop new molecular-based tools for health surveillance, biological dosimetry, and individual susceptibility determination. An emphasis is placed on research that utilizes the unique resources and tools developed in the Department's human genome and cellular and molecular biology programs.

The Biological Research program provides scientific information to understand and mitigate the potential health effects from energy activities and cleanup operations. Emphasis is placed on the risks to human health from exposures to low-levels of radiation and chemicals both at home (for example, radon) and at work (for example, waste site cleanup). This includes research on the toxicity and the mechanisms of that toxicity of chemicals and radiations found in DOE cleanup sites in support of the DOE's waste cleanup efforts and to exploit advances made in the genome program by facilitating their introduction and use in both basic and applied research with a continued emphasis on improved estimation of risk to individuals.

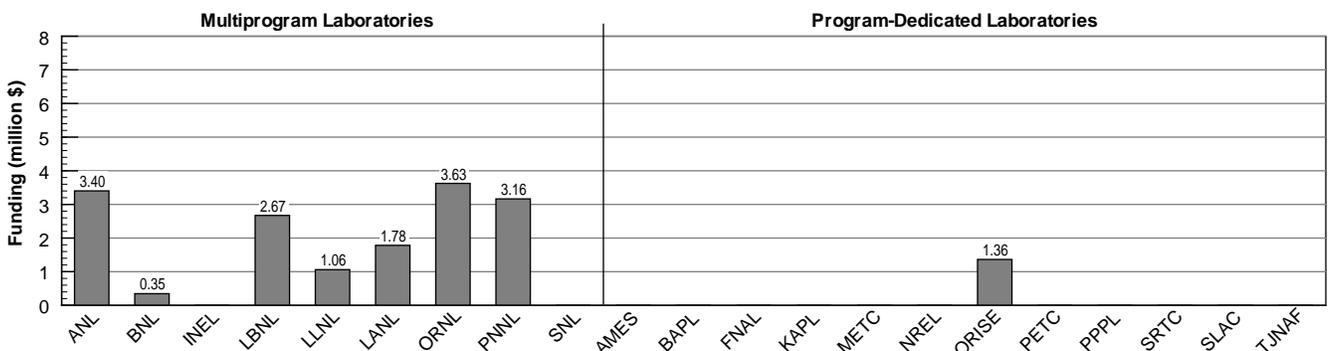
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Radiological and Chemical Physics

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Health Effects
B&R Code: KP0303

Laboratory Complex

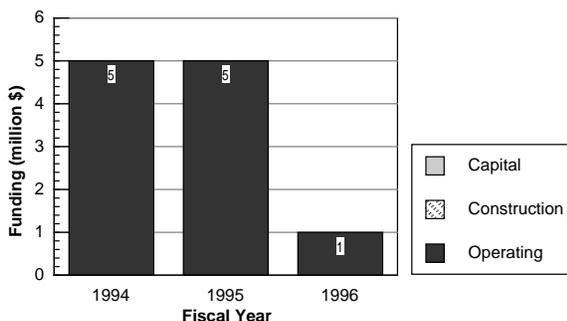
Principal Laboratories: ORNL, PNNL
Contributing Laboratories: ANL, LBNL
Participating Laboratories: ORISE

Mission Activity Description

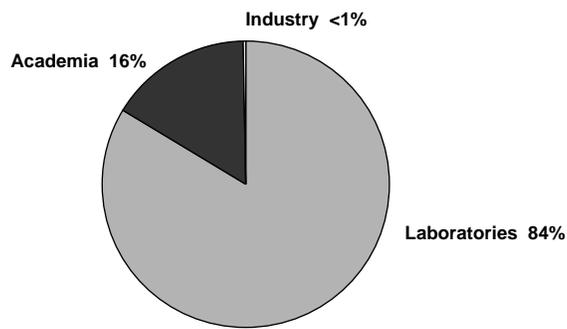
The Health Effects Research Program develops biological information and advanced technologies relevant to understanding and mitigating the potential health effects of energy development, energy use, and waste cleanup. The thrust of this program is to improve our abilities to estimate the type and magnitude of human health risk that result from low-level exposures to energy-related agents. Such agents include radiation and chemicals both at home (for example, radon) and at work (for example, waste site cleanup). Factors affecting susceptibility to exposure or disease vary from one individual to another and may, therefore, significantly alter the health impacts of low-level exposures to some individuals more than to others. The Health Effects program conducts research to develop new molecular-based tools for health surveillance, biological dosimetry, and individual susceptibility determination. An emphasis is placed on research that utilizes the unique resources and tools developed in the Department's human genome and cellular and molecular biology programs.

The Radiological and Chemical Physics subprogram has provided basic information on the initial events that occur following the interactions of radiation with biological molecules. This subprogram is being phased out in fiscal year 1996.

Funding History

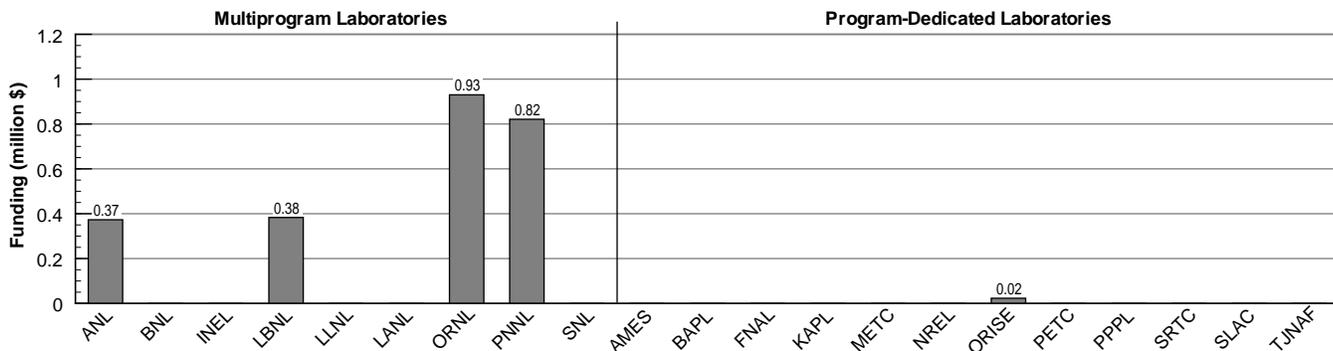


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Health Effects.

Fiscal Year 1995 Funding Profile



Structural Biology

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: General Life Sciences
B&R Code: KP0401

Laboratory Complex

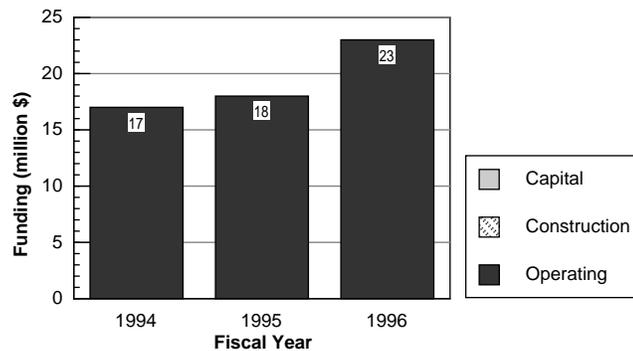
Principal Laboratories: BNL
Contributing Laboratories: ANL, LBNL
Participating Laboratories: LANL, LLNL, ORNL, PNNL, SLAC

Mission Activity Description

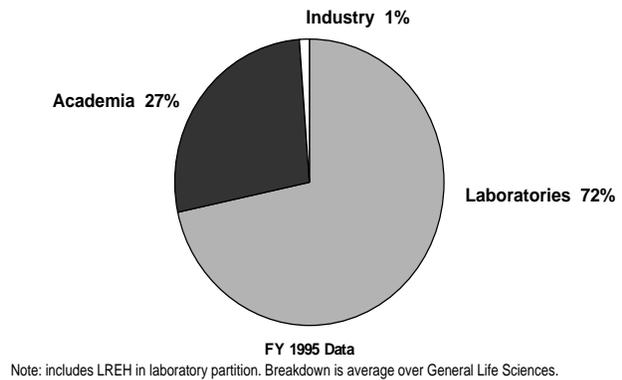
The General Life Sciences Research Program develops basic scientific information to understand fundamental life processes and molecules. Research provides critical information regarding the molecular nature of the human genome and genomes of other organisms, and it explores how the basic chemical structures of important biological molecules relates to their function in living cells. The program develops biological information and advanced technologies for use in health effects research studies; and it develops and utilizes unique DOE resources and facilities to provide information to underpin new technologies to address Departmental and national goals in the areas of biotechnology and waste cleanup. The information and technologies developed in this research advance the biotechnology missions of the Department including: improved industrial processes, increased agricultural yields, energy production from biomass, environmental remediation, and improved human health.

Structural Biology research develops and supports DOE national user facilities such as the Advanced Light Source at LBNL, the new multipurpose beamline at SSRL, and the new Structural Biology Center at the Synchrotron Radiation Source at ANL. These facilities enable scientists to determine the molecular structure of important biological molecules, such as enzymes, antibodies, or other proteins. This knowledge will provide insight into the structure-function relationships, such as enzymes modified to enhance bioremediation (for example, to detoxify a hazardous waste). Computational structural biology combines computer science, structural biology, and genome research to predict the functions of biological molecules.

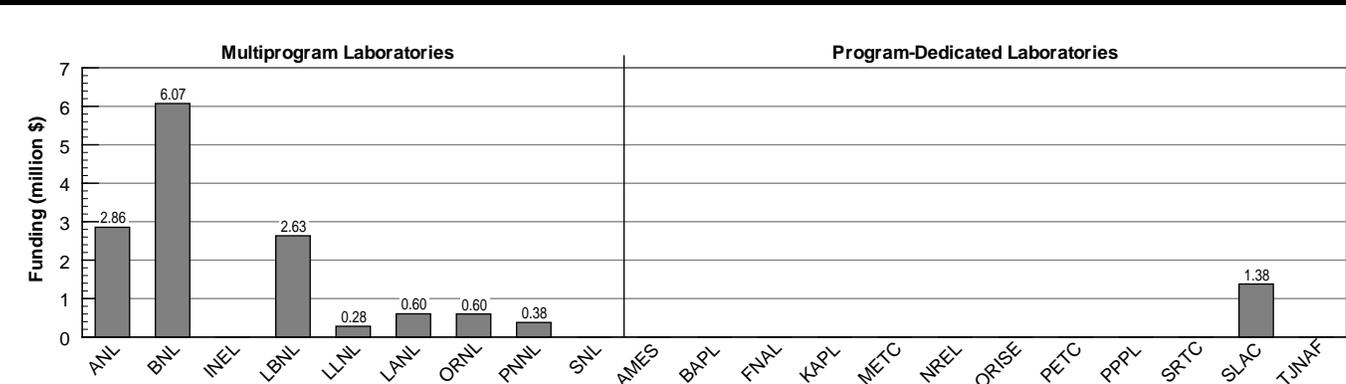
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Molecular and Cellular Biology

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: General Life Sciences
B&R Code: KP0402, KP0403

Laboratory Complex

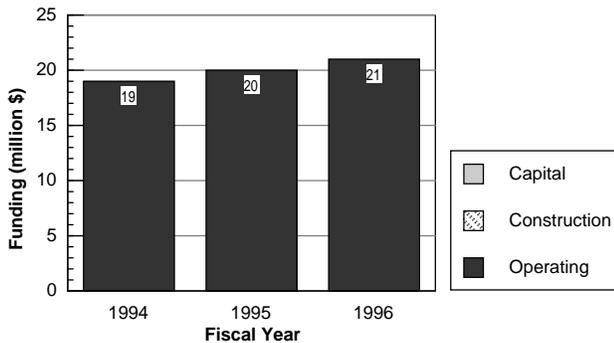
Principal Laboratories: ORNL
Contributing Laboratories: BNL, LANL, LBNL, LLNL
Participating Laboratories: ANL, ORISE, PNNL

Mission Activity Description

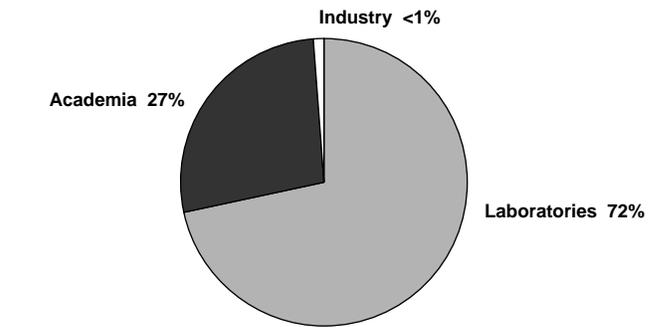
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Basic Molecular and Cellular Biology research identifies and characterizes genes that repair damaged DNA and control cell proliferation to determine individual responsiveness to energy-related materials and susceptibility to adverse health effects, including cancer. Research includes the use of isolated human and animal DNA repair genes and enzymes to assess variability in repair among human populations.

Funding History

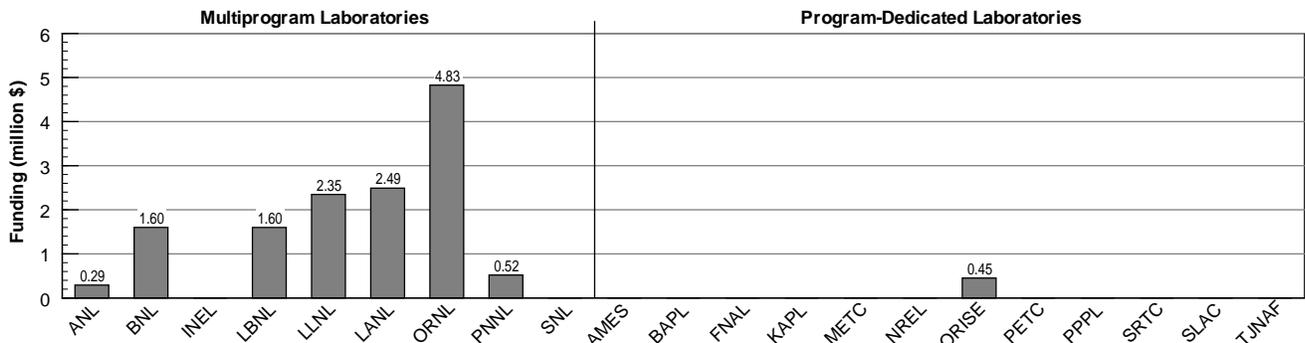


Laboratory-Academia-Industry Participation



FY 1995 Data
 Note: Includes LREH in laboratory partition. Breakdown is average over General Life Sciences.

Fiscal Year 1995 Funding Profile



Genome Research

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: General Life Sciences
B&R Code: KP0404

Laboratory Complex

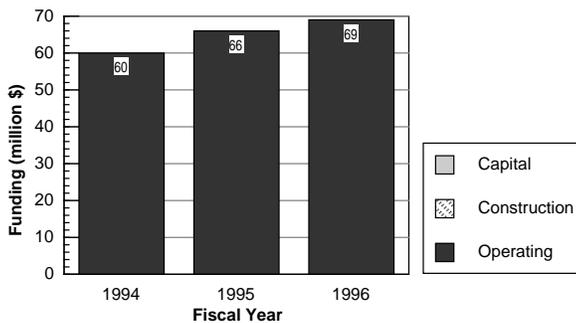
Principal Laboratories: LANL, LBNL, LLNL
Contributing Laboratories: None
Participating Laboratories: Ames, ANL, BNL, ORISE, ORNL, PNNL

Mission Activity Description

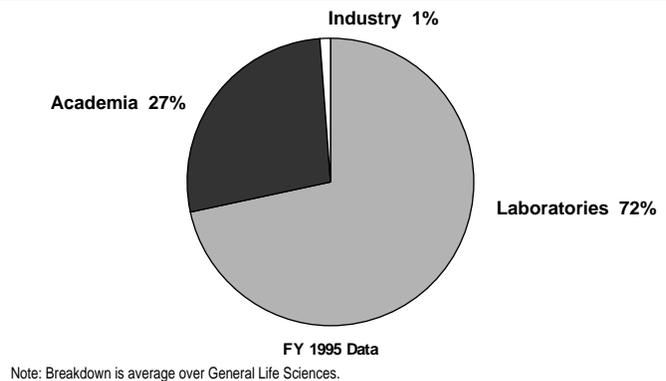
The General Life Sciences Research Program develops basic scientific information to understand fundamental life processes and molecules. Research provides critical information regarding the molecular nature of the human genome and genomes of other organisms, and it explores how the basic chemical structures of important biological molecules relates to their function in living cells. The program develops biological information and advanced technologies for use in health effects research studies; and it develops and utilizes unique DOE resources and facilities to provide information to underpin new technologies to address Departmental and national goals in the areas of biotechnology and waste cleanup. The information and technologies developed in this research advance the biotechnology missions of the Department including: improved industrial processes, increased agricultural yields, energy production from biomass, environmental remediation, and improved human health.

Genome Research develops and applies new technologies and resources to map and determine the sequence of bases that make up the DNA found in a typical human cell and supports studies in ethical, legal, and social implications (ELSI), especially issues of privacy, commercialization, and education. Microbial genome research characterizes the DNA and proteins in microbes with biotechnology applications in energy production, environmental bioremediation, and industry.

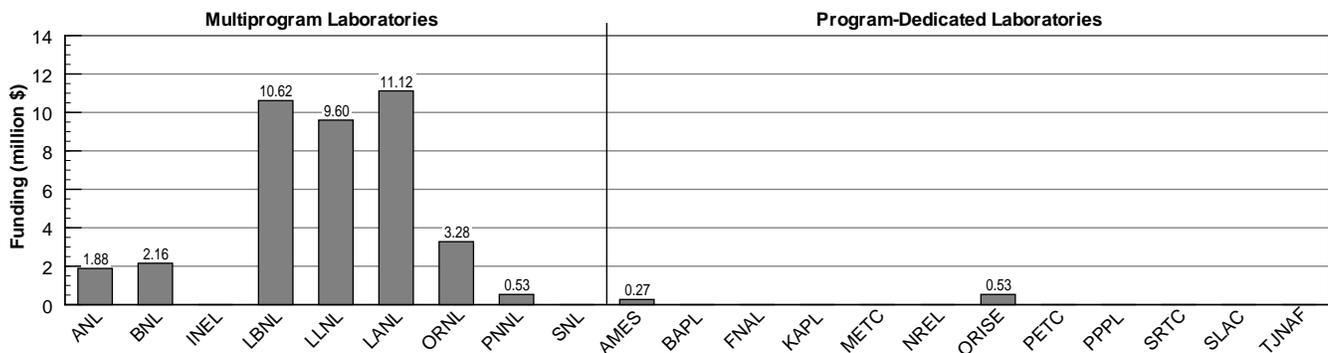
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Global Change Research

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Carbon Dioxide Research
B&R Code: KP0501, KP0506, KP0508, KP0509, KP0510

Laboratory Complex

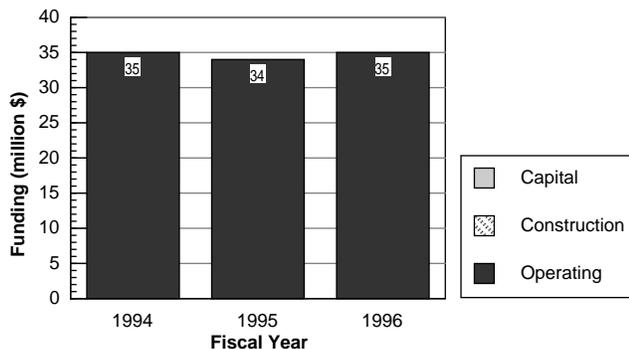
Principal Laboratories: LLNL
Contributing Laboratories: ORISE, ORNL
Participating Laboratories: ANL, BNL, LANL, LBNL, PNNL

Mission Activity Description

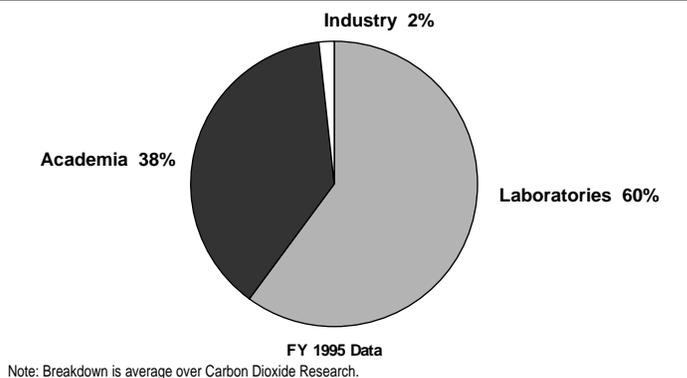
Carbon Dioxide Research is focused on understanding the basic chemical, physical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. The research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming.

The link between carbon dioxide and global warming has important impacts on energy policy, economic development, and international affairs. Global Change Research emphasis is placed on experimental studies of the cloud-climate feedback, on innovative hardware-software applications to advanced climate models, and on the impacts and mitigation of global environmental change. In the core program, the carbon cycle research will address fluxes of carbon dioxide (CO₂) between atmosphere, biosphere, and land and ocean surfaces, and of cycling of carbon within the terrestrial biosphere and the oceans. This understanding is required for predicting atmospheric CO₂ change due to fossil fuel use and deforestation and for estimating sinks for excess CO₂ generated by fossil fuel. Products from this research include mechanisms for sequestering carbon as a means for stabilizing atmospheric CO₂. By mitigating atmospheric greenhouse gas increases and associated climate change, this research provides vital information for assessments of future sustainable development and environmental protection. The core program also develops and tests models that predict the global and regional climate change induced by increasing atmospheric concentrations of CO₂ and other greenhouse gases. This includes modeling climate change, with emphasis on the coupled climate system of the atmosphere, ocean, and cryosphere. A key element is support of the Program for Climate Model and Diagnosis and Intercomparison which engages virtually every climate modeling group in the world.

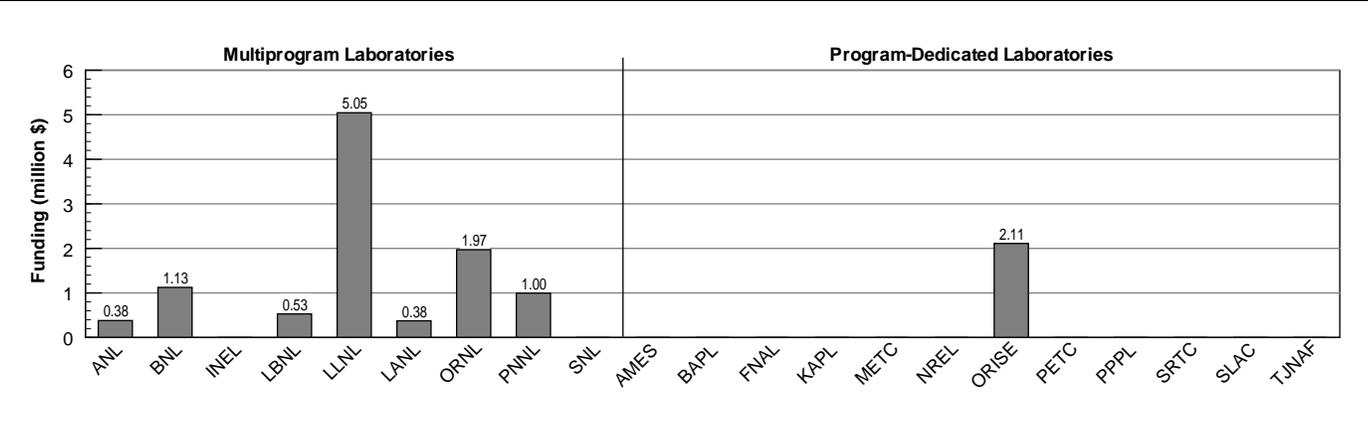
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Carbon Dioxide Information Analysis

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Carbon Dioxide Research
B&R Code: KP0502

Laboratory Complex

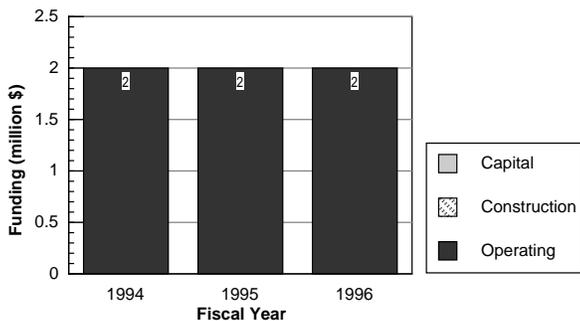
Principal Laboratories: ORNL
Contributing Laboratories: ORISE
Participating Laboratories: None

Mission Activity Description

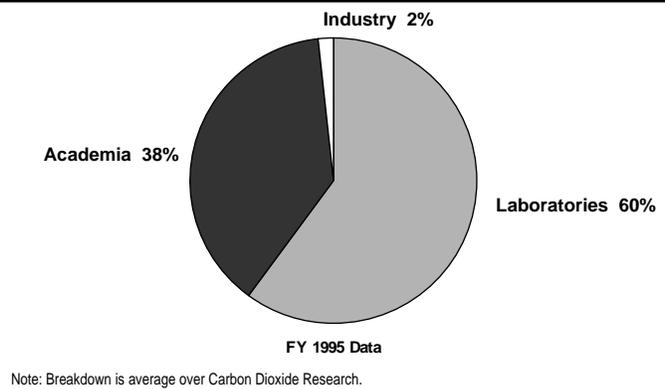
Carbon Dioxide Research is focused on understanding the basic chemical, physical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. The research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming.

The Carbon Dioxide Information Analysis activity operates the ORNL Carbon Dioxide Information Analysis Center, including its operation as a World Data Center under the United Nations auspices. The Center conducts quality audits on global and regional data sets and makes the data sets available to global change researchers and policy makers.

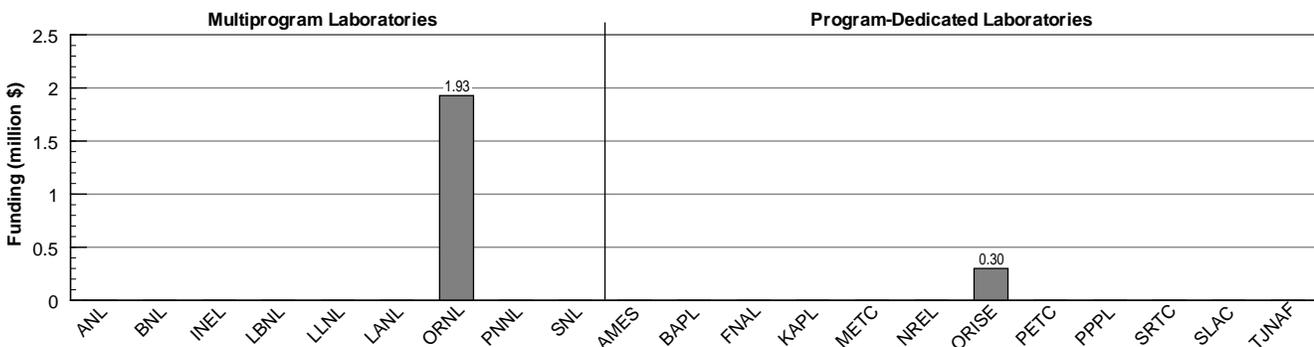
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Advanced Mathematics and Model Physics

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Carbon Dioxide Research
B&R Code: KP0503

Laboratory Complex

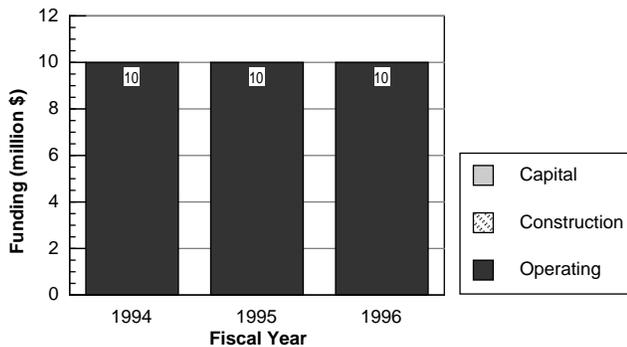
Principal Laboratories: LANL
Contributing Laboratories: LLNL, ORNL
Participating Laboratories: ANL, BNL, PNNL, SNL

Mission Activity Description

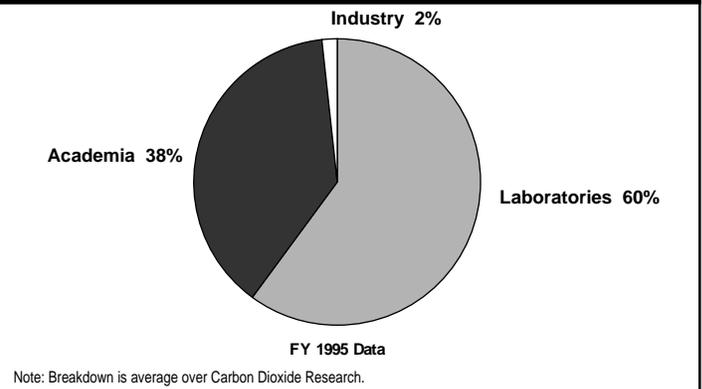
Research is focused on understanding the basic chemical, physical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. The research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming.

The Computer Hardware, Advanced Mathematics and Model Physics (CHAMMP) activity accelerates and improves prediction of the response of global and regional climates to the increasing atmospheric concentration of CO₂ and other greenhouse gases. Developing advanced climate models requires a better theoretical foundation for long-term climate prediction and computers capable of increasing throughput by a factor of a least 10,000 over 1990 era models, as well as mathematical formulations and software that use parallel processing and improved algorithms.

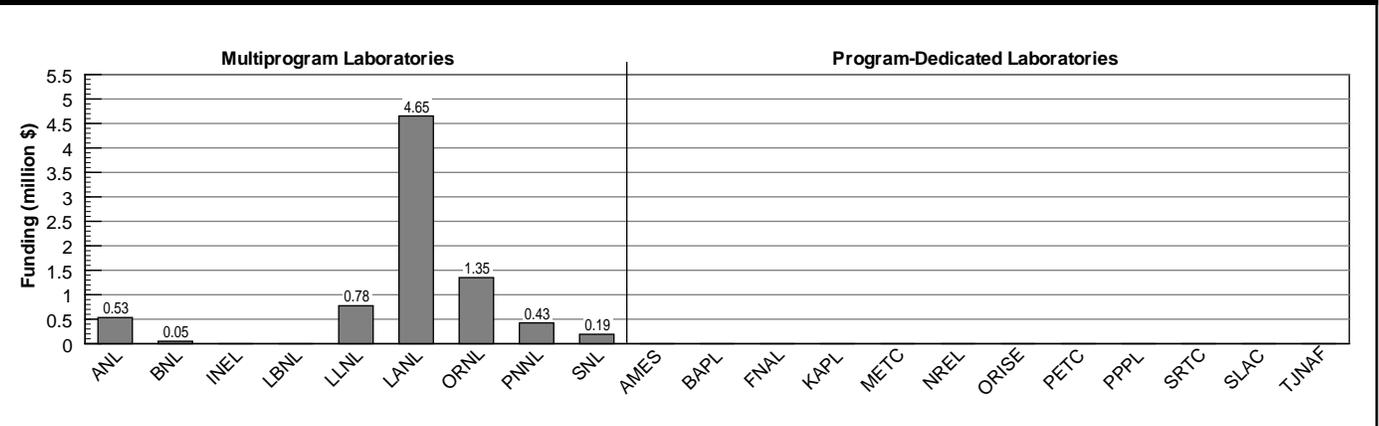
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Atmospheric Radiation Measurement

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Carbon Dioxide Research
B&R Code: KP0504

Laboratory Complex

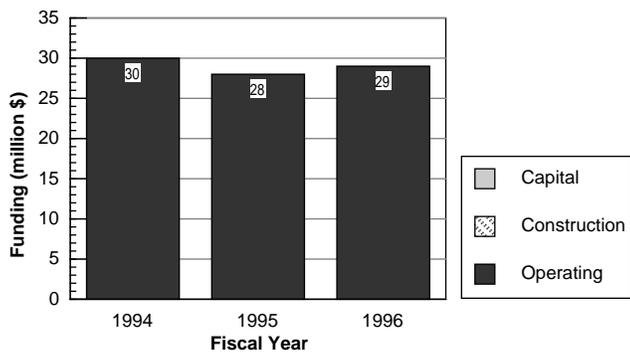
Principal Laboratories: PNNL
Contributing Laboratories: None
Participating Laboratories: ANL, BNL, LANL, LLNL, SNL

Mission Activity Description

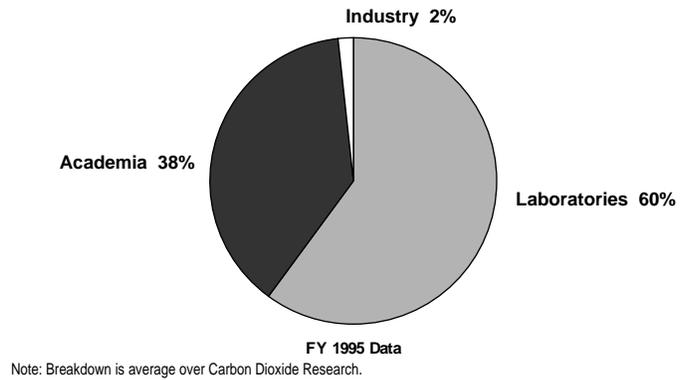
Research is focused on understanding the basic chemical, physical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. The research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming.

The Atmospheric Radiation Measurement activity determines the radiation balance from the surface of the Earth to the top of the atmosphere and the atmospheric characteristics responsible for this balance, improves the parameterization of the formation and evolution of clouds in climate models, creates an experimental testbed for testing process models used in general circulation models and supports satellite ground-truth measurements. The research involves a network of ground-based remote sensing instruments as well as campaign studies using aircraft and tethered platforms. The research focuses on quantitative links between greenhouse gases and climate change and examines climate feedbacks and energy fluxes in the coupled land-atmosphere-ocean system. The research also examines atmospheric cycling and transformation of radiatively and chemically important trace species.

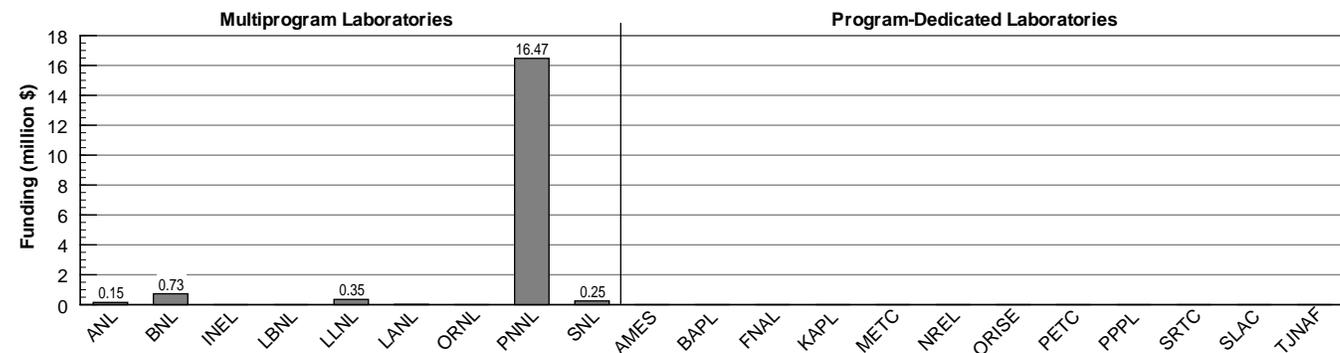
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Oceans Research

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Carbon Dioxide Research
B&R Code: KP0505

Laboratory Complex

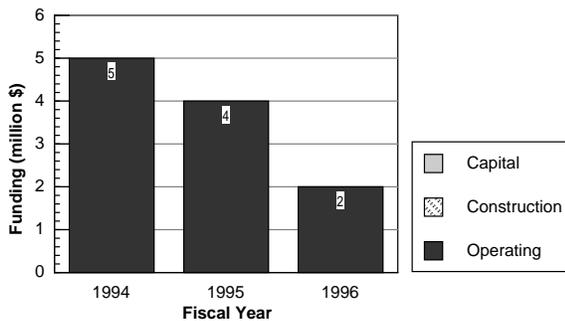
Principal Laboratories: BNL, PNNL
Contributing Laboratories: None
Participating Laboratories: ORNL

Mission Activity Description

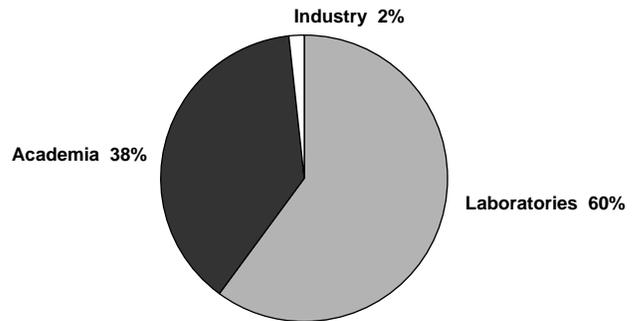
Research is focused on understanding the basic chemical, physical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. The research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming.

The Oceans Research activity conducts a global survey of CO₂ in the ocean to improve ocean circulation models used for climate research. The research involves integrated laboratory, observational, and modeling studies to understand mixing, transport processes, and carbon cycling in the ocean and the exchange of heat and carbon between the ocean and the atmosphere. The activity is focused on central questions concerning the rates of carbon and heat transport in the ocean, and changes in the oceanic CO₂ reservoir.

Funding History

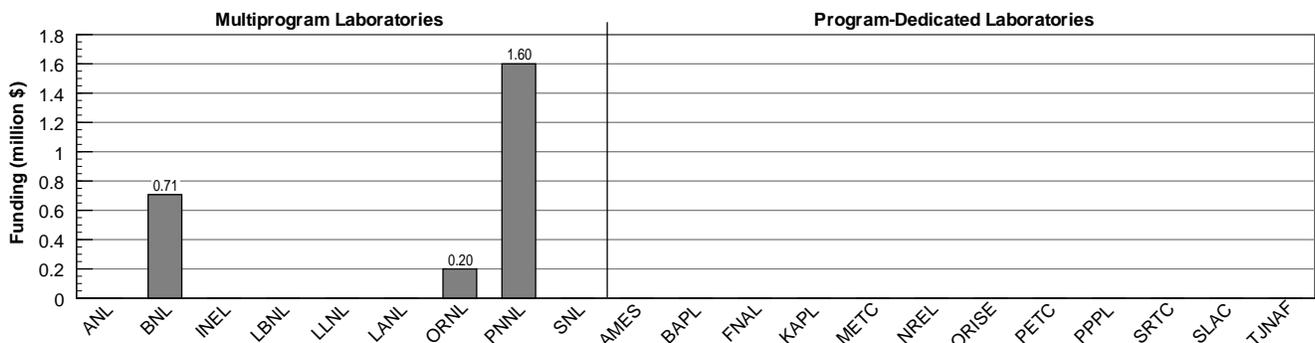


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Carbon Dioxide Research.

Fiscal Year 1995 Funding Profile



Radioisotope Development

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Medical Applications
B&R Code: KP060101

Laboratory Complex

Principal Laboratories: BNL, FNAL
Contributing Laboratories: ORNL
Participating Laboratories: None

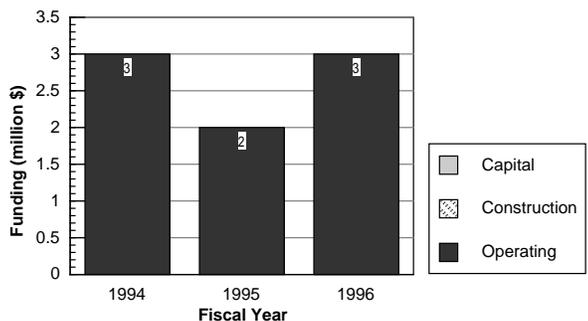
Mission Activity Description

The Medical Applications research program, mandated initially by the Atomic Energy Act of 1946 to promote use of radioactive materials and radiation for medical applications, has provided the scientific and technological foundation for the establishment of nuclear medicine as a major clinical specialty. Research in radioisotope production, radiopharmaceutical chemistry, radioisotope imaging instrumentation together with investigation of a broad range of diagnostic and therapeutic applications demonstrated and validated advanced diagnostic and therapeutic capability and also led to the establishment of a vital radionuclide production, radiopharmaceutical development, and radionuclide instrumentation industry. Technology developed under this program provides a noninvasive capability for detection and localization of small lesions, for quantitative measurement of dynamic organ function, and for selective radioisotope and radiation therapy of cancer and has achieved a reduction in medical costs through, for example, avoidance of unnecessary surgery.

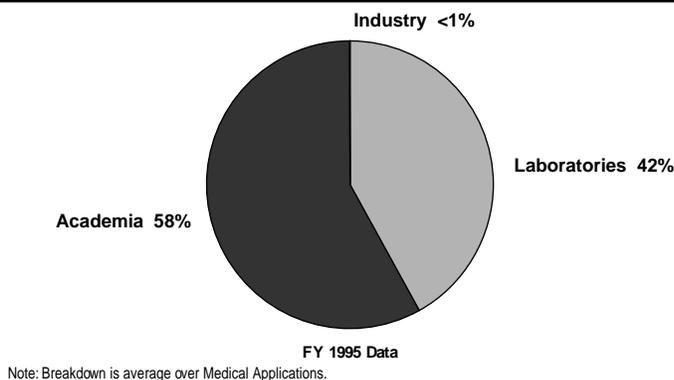
The central goal and objectives of the Medical Applications program are to enhance the Department's nuclear and other energy technologies by introducing recent advances in molecular and structural biology, develop integrated powerful tools of radiotracer agents, positron emission tomography, single photon emission computed tomography, advanced image processing and informatics for noninvasive diagnosis of patients' problems, and the tools of molecular therapies, including genetically engineered monoclonal antibodies and boron carrier compounds.

Radioisotope Development includes efforts in optimizing target design, radioisotope processing, purification, and generator development for medically useful radioisotopes. Research emphasis is on new radioisotope generators for onsite storage, separation, and availability of radioisotopes for medical use in a clinical setting.

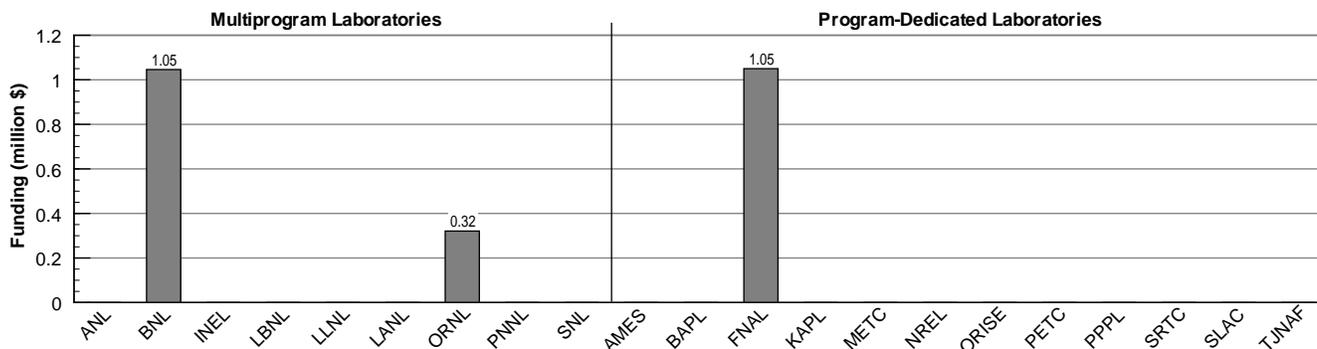
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Radiopharmaceuticals

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Medical Applications
B&R Code: KP060102

Laboratory Complex

Principal Laboratories: BNL, ORNL
Contributing Laboratories: None
Participating Laboratories: LANL, LBNL, ORISE

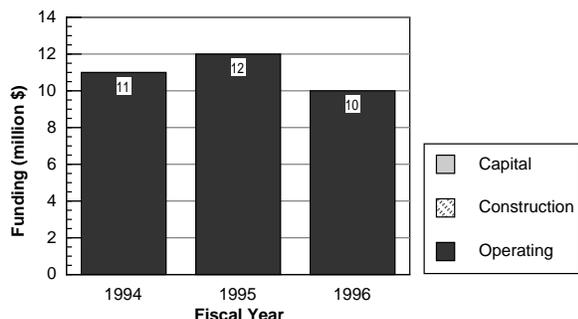
Mission Activity Description

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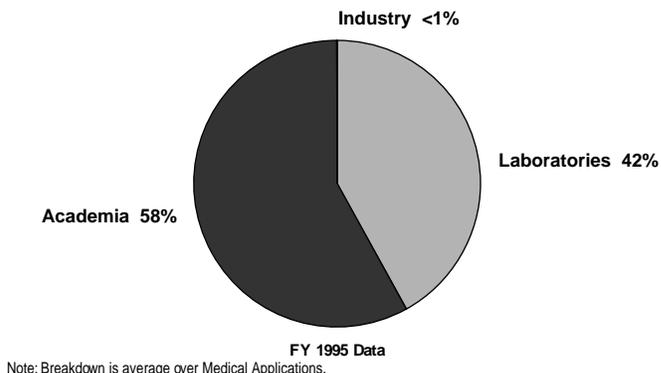
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Radiopharmaceuticals research includes the pursuit of new organic synthesis and genetic engineering approaches to develop molecular probes of high and selective target specificity. Radiolabeling of new medicinal agents and the agents of substance abuse are emphasized. New radiolabeled agents are studied for diagnosis and therapy with special focus on heart, brain, and cancer targeting. Radiopharmaceutical research, in addition to the studies of cancer detection and treatment, and brain and heart metabolism, will also contribute to the diagnosis and therapy of other organs.

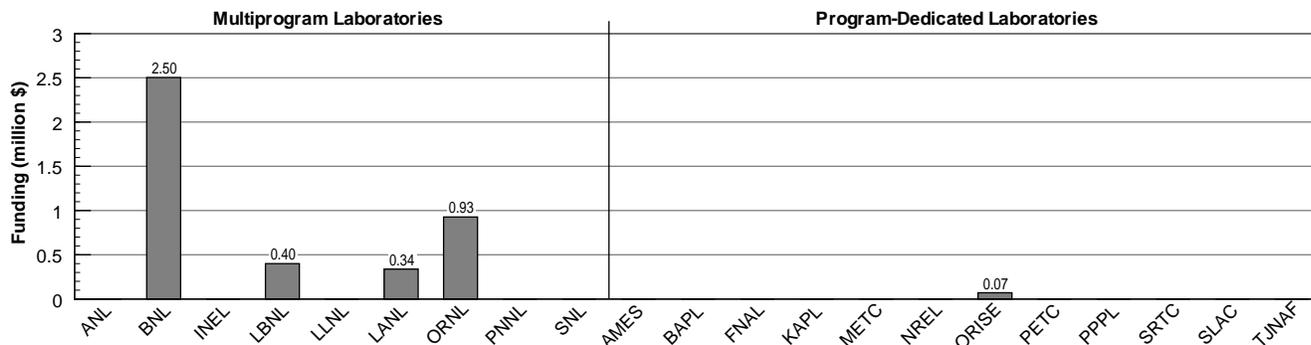
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Medical Imaging Technology

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Medical Applications
B&R Code: KP060103

Laboratory Complex

Principal Laboratories: BNL, LANL, LBNL
Contributing Laboratories: None
Participating Laboratories: None

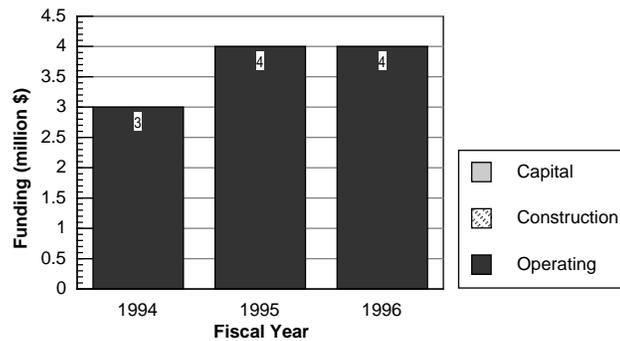
Mission Activity Description

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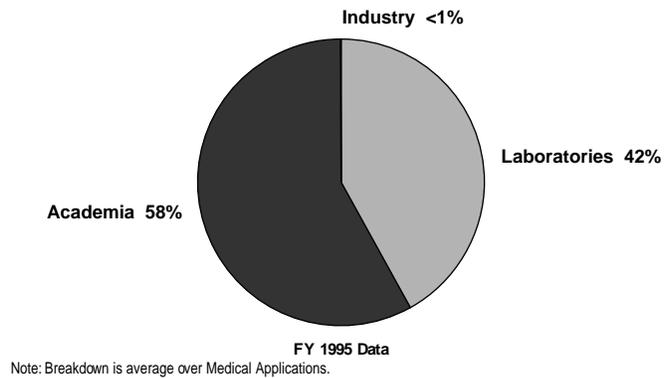
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The Instrumentation program develops improved measurement imaging technology to achieve higher spatial resolution and more accurate quantitation of organ physiology. New technology for fabricating photodiode detector arrays has will be used to assemble positron emission tomography (PET) detector modules with very low electronic noise. The technology will be transferred to a U.S. manufacturer. To overcome the limitation of existing scintillation detectors for PET, a systematic search of promising crystals will be made in collaboration with theoreticians to guide the search.

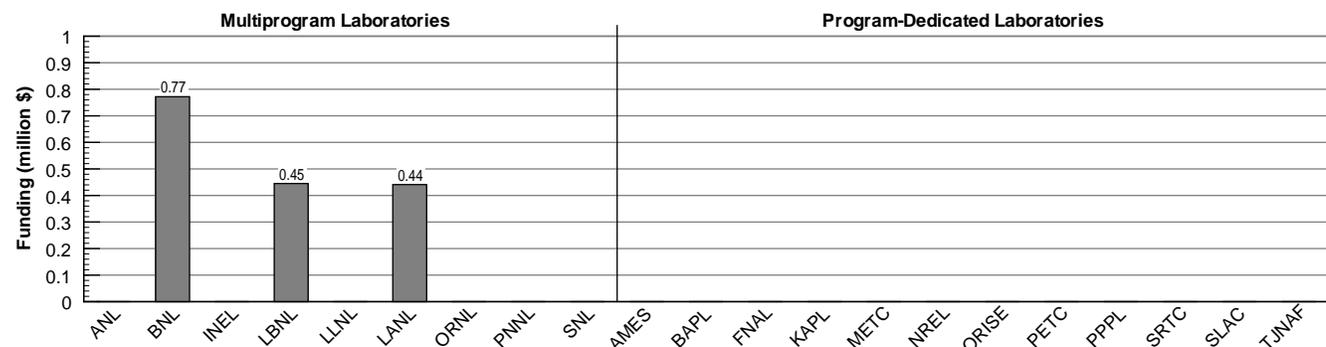
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Clinical Feasibility

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Medical Applications
B&R Code: KP060104

Laboratory Complex

Principal Laboratories: BNL, LBNL
Contributing Laboratories: ORISE
Participating Laboratories: None

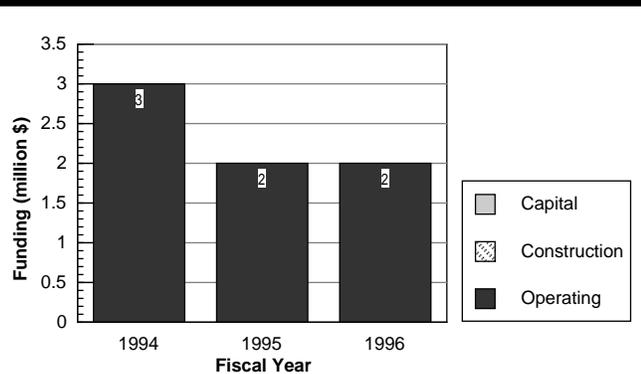
Mission Activity Description

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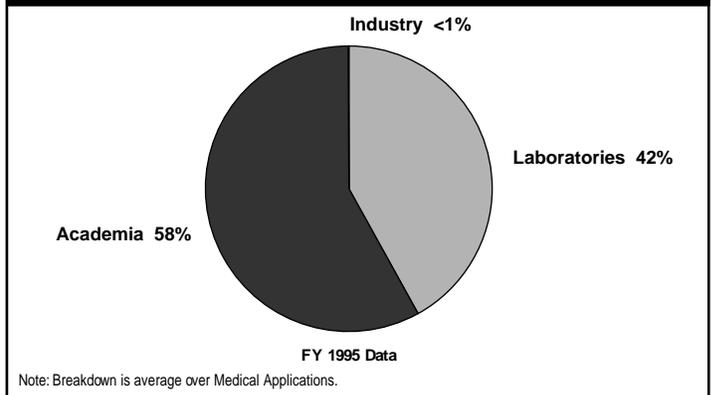
The central goal and objectives of the Medical Applications program are to enhance the Department's nuclear and other energy technologies by introducing recent advances in molecular and structural biology, develop integrated powerful tools of radiotracer agents, positron emission tomography, single photon emission computed tomography, advanced image processing and informatics for noninvasive diagnosis of patients' problems, and the tools of molecular therapies, including genetically engineered monoclonal antibodies and boron carrier compounds.

The Clinical Feasibility effort extends the basic findings from the research laboratory toward the initial investigation of their applicability in human patients. The radioisotope, radiopharmaceutical, and monoclonal antibody agents with promising preliminary biological results through animal screening data will be further developed to study the clinical potential in humans and for technology transfer.

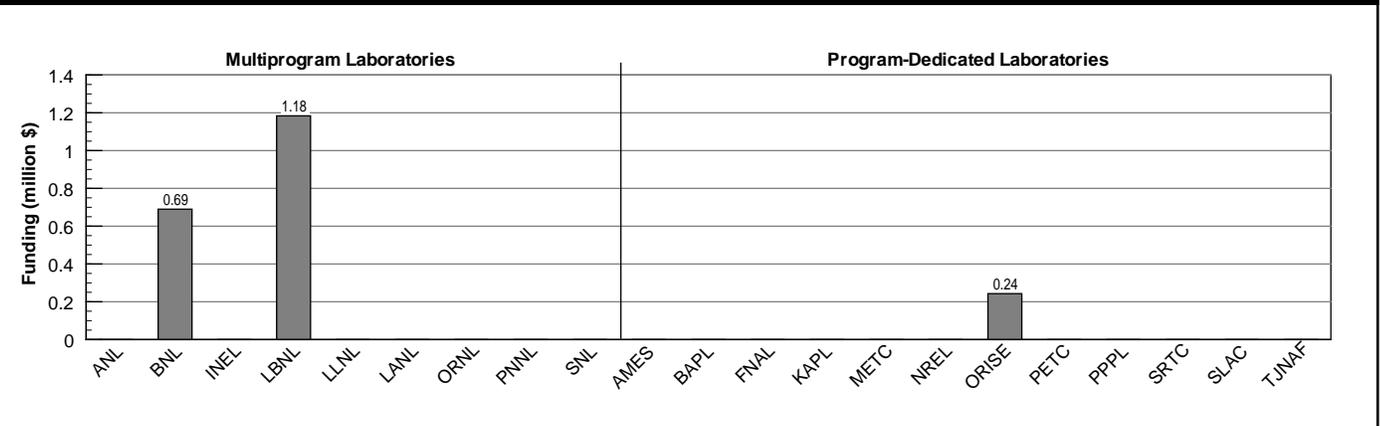
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Boron Neutron Capture Therapy

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Medical Applications
B&R Code: KP060105

Laboratory Complex

Principal Laboratories: BNL, INEL
Contributing Laboratories: None
Participating Laboratories: None

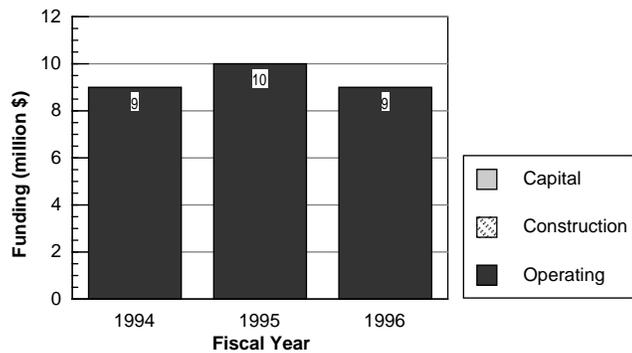
Mission Activity Description

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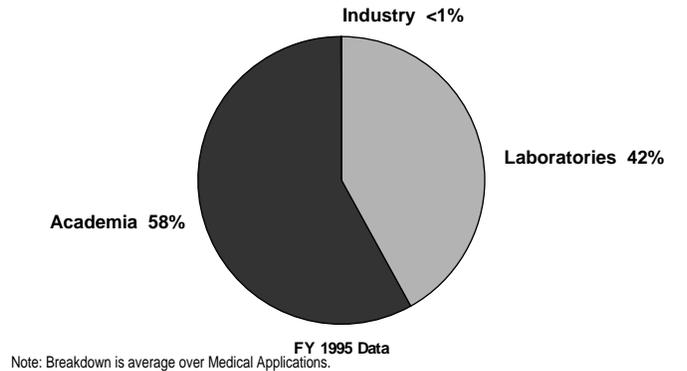
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Radiation therapy research explores the application of new radioactive materials and radiation technology as potential radiation therapy methodologies. In Boron Neutron Capture Therapy, a strong emphasis is placed on conducting human clinical trials, closely coordinated with the Food and Drug Administration, to demonstrate application to the treatment of brain tumors, such as glioblastoma and melanoma. For example, it is anticipated that the compound, boronphenylalanine will advance to Phase II clinical trials using the Massachusetts Institute of Technology reactor, and the fructose derivative of this compound will enter Phase II trials at the upgraded Brookhaven Medical Research Reactor.

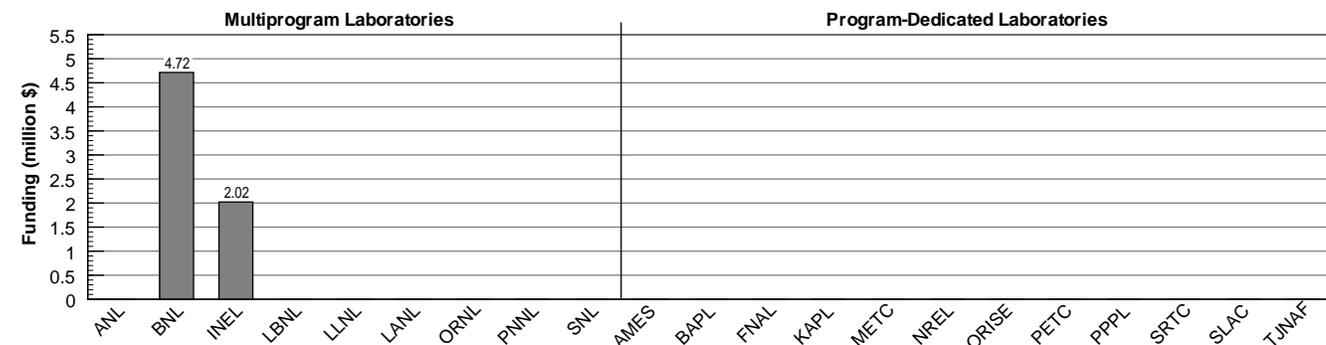
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Molecular Nuclear Medicine

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Medical Applications
B&R Code: KP060106

Laboratory Complex

Principal Laboratories: BNL, LBNL
Contributing Laboratories: None
Participating Laboratories: None

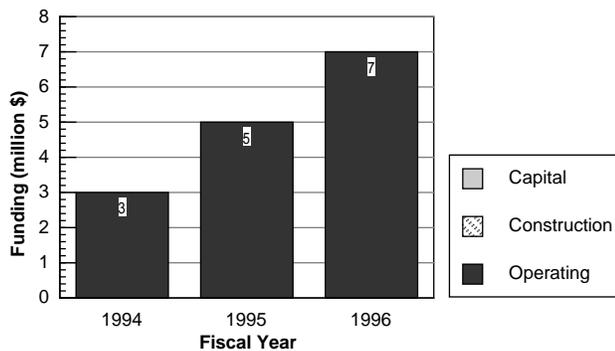
Mission Activity Description

The Medical Applications research program, mandated initially by the Atomic Energy Act of 1946 to promote use of radioactive materials and radiation for medical applications, has provided the scientific and technological foundation for the establishment of nuclear medicine as a major clinical specialty. Research in radioisotope production, radiopharmaceutical chemistry, radioisotope imaging instrumentation together with investigation of a broad range of diagnostic and therapeutic applications demonstrated and validated advanced diagnostic and therapeutic capability and also led to the establishment of a vital radionuclide production, radiopharmaceutical development, and radionuclide instrumentation industry. Technology developed under this program provides a noninvasive capability for detection and localization of small lesions, for quantitative measurement of dynamic organ function, and for selective radioisotope and radiation therapy of cancer and has achieved a reduction in medical costs through, for example, avoidance of unnecessary surgery.

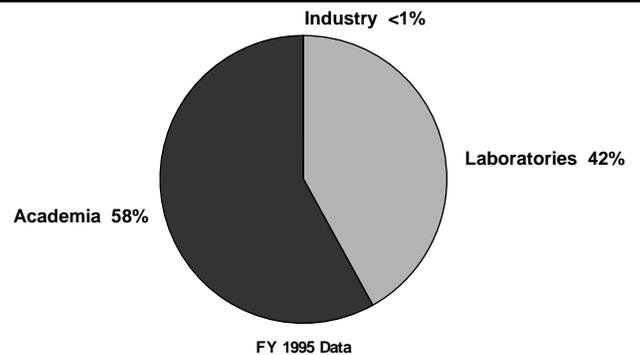
The central goal and objectives of the Medical Applications program are to enhance the Department's nuclear and other energy technologies by introducing recent advances in molecular and structural biology, develop integrated powerful tools of radiotracer agents, positron emission tomography, single photon emission computed tomography, advanced image processing and informatics for noninvasive diagnosis of patients' problems, and the tools of molecular therapies, including genetically engineered monoclonal antibodies and boron carrier compounds.

Molecular Nuclear Medicine research includes investigations of radiolabeled molecular probes for neurotransmitter and neuroreceptor studies, while exploiting new molecular biology approaches for labeling and investigating biological function. This research is directed toward development of advanced nuclear medicine technology and initial exploration of its medical applicability. It complements the National Institutes of Health (NIH) research programs, which are more strongly clinical and diseases oriented. Emphasis continues on nucleic acid, peptide, and genetically engineered protein and antibody probes to study neuroreceptors and neurotransmitters regulating brain function and to study tumor receptors and tumor receptor targeting.

Funding History

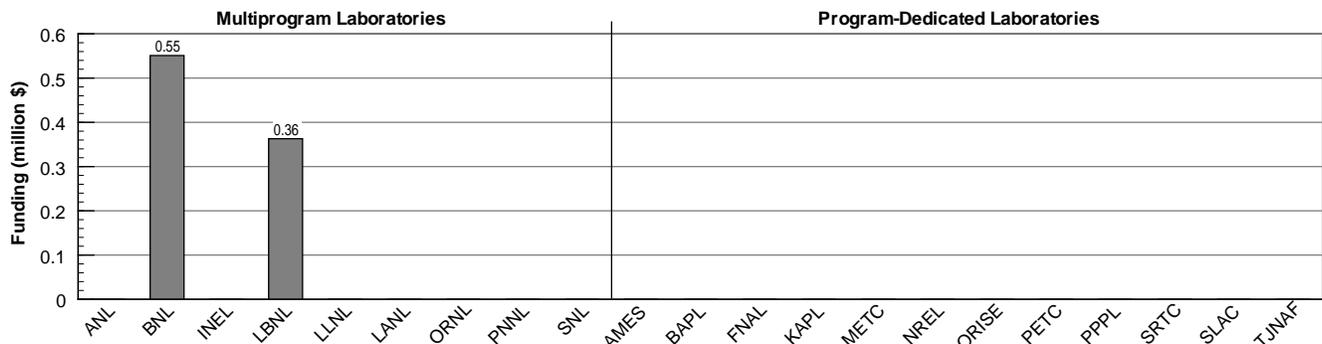


Laboratory-Academia-Industry Participation



Note: Breakdown is average over Medical Applications.

Fiscal Year 1995 Funding Profile



Advanced Biomedical Science and Technology

Department of Energy Program

Program: Energy Research
Office: Health and Environmental Research
Element: Medical Applications
B&R Code: KP060107

Laboratory Complex

Principal Laboratories: INEL
Contributing Laboratories: None
Participating Laboratories: None

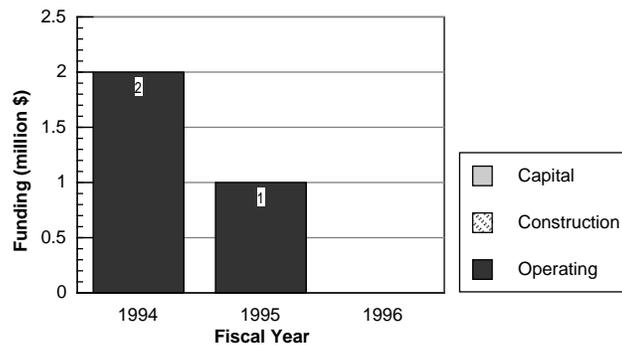
Mission Activity Description

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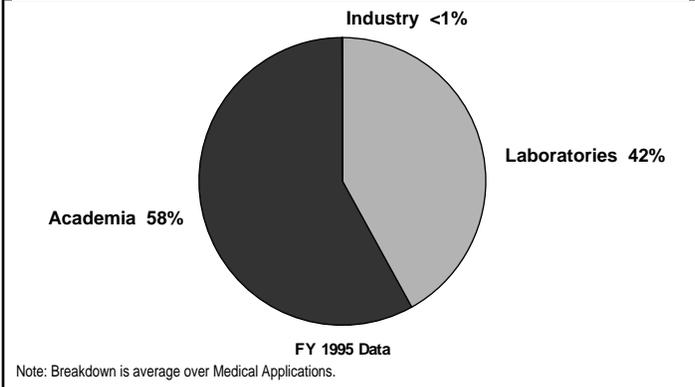
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The long-range goal of the Advanced Biomedical Science and Technology initiative is to develop and facilitate the application and transfer of advanced highly efficient medical technologies and scientific advancements to cost-effective clinical applications for commercialization. This initiative is in response to the need within the United States for a more efficient and cost-effective health care system coupled with the aim of harnessing some of the unique scientific and technological capabilities that have been developed within the defense and nondefense scientific communities to accomplish that end.

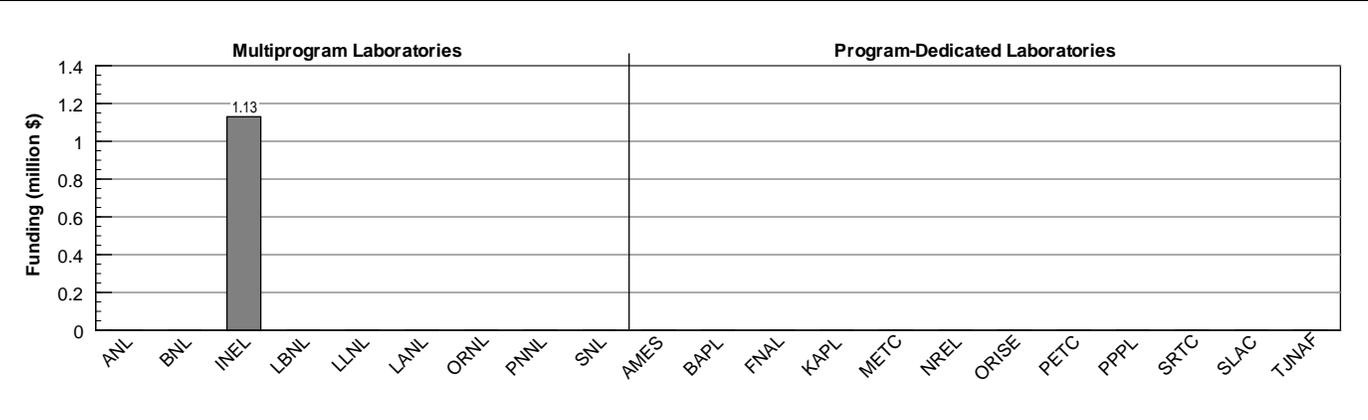
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



High-Energy Physics

Department of Energy Program

Program: Energy Research
Office: High-Energy Nuclear Physics
Element: High-Energy Physics
B&R Code: KA01

Laboratory Complex

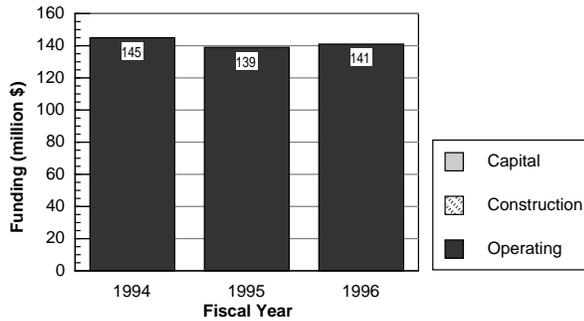
Principal Laboratory: FNAL, LBNL, SLAC
Contributing Laboratories: ANL, BNL,
Participating Laboratories: CBAF, LANL, ORNL, PNNL

Mission Activity Description

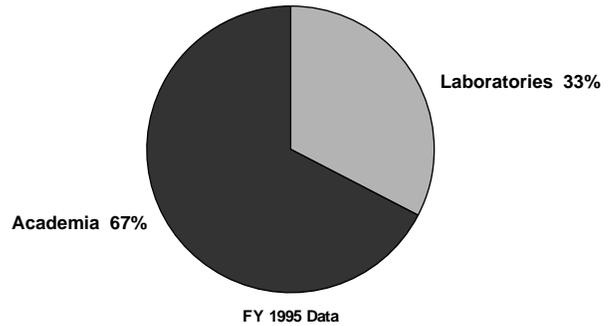
Research in high-energy physics is directed at understanding the nature of matter and energy at the most fundamental level, and the basic forces that govern all processes in nature. The primary goal of the program is to acquire new knowledge and understanding. To carry out this forefront basic research, the program develops advanced technologies for application to accelerators and detectors and new, highly sophisticated approaches to data reduction and analysis. Such technologies often find near-term as well as long-term applications in other fields.

The High-Energy Physics activity supports experimental and theoretical research in high-energy physics. This research probes the nature of matter and energy at the most fundamental level and the characteristics of the basic forces in nature. Experimental research activities include planning, design, fabrication, and installation of experiments; conduct of experiments; analysis and interpretation of data; and publication of results. Theoretical physics research provides the framework for interpreting and understanding observed phenomena and, through predictions and extrapolations based on current understanding, identifies key questions for future experimental explorations.

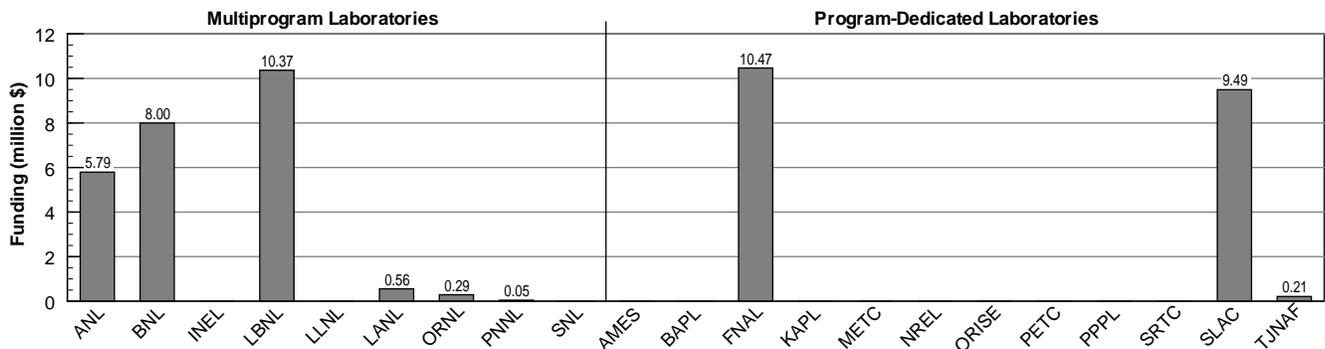
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



High-Energy Physics Facilities Operations

Department of Energy Program

Program: Energy Research
Office: High-Energy and Nuclear Physics
Element: High-Energy Physics
B&R Code: KA02

Laboratory Complex

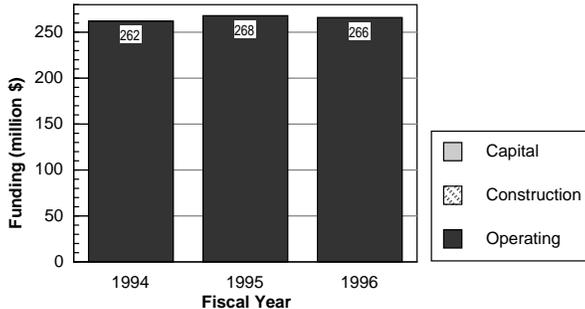
Principal Laboratory: FNAL, SLAC
Contributing Laboratories: BNL
Participating Laboratories: ANL, LLNL, ORNL

Mission Activity Description

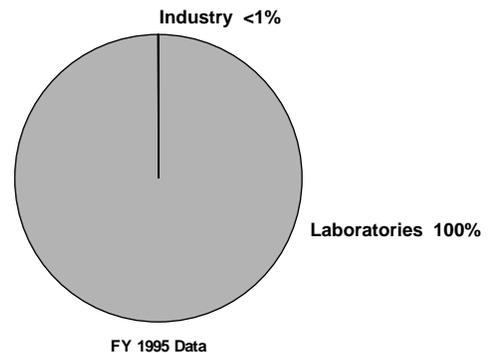
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The High-Energy Physics Facilities Operations activity operates the large accelerator and detector facilities, which are the essential tools that enable scientists in university- and laboratory-based research groups to perform experimental research in high-energy physics. This includes the operation and maintenance of the national laboratory research facilities, including accelerators, colliders, secondary beam lines, detector facilities for experiments, experimental areas, computing, and computing networking facilities.

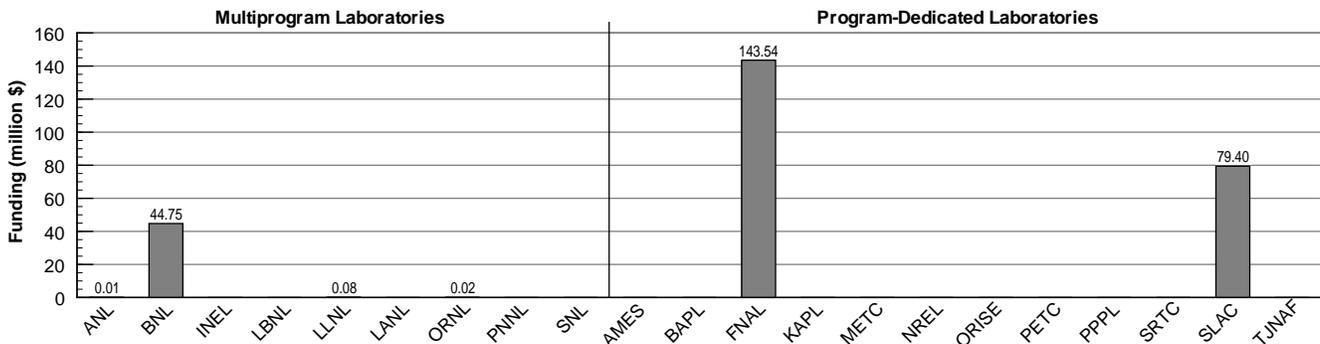
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



High-Energy Technology

Department of Energy Program

Program: Energy Research
Office: High-Energy and Nuclear Physics
Element: High-Energy Physics
B&R Code: KA03

Laboratory Complex

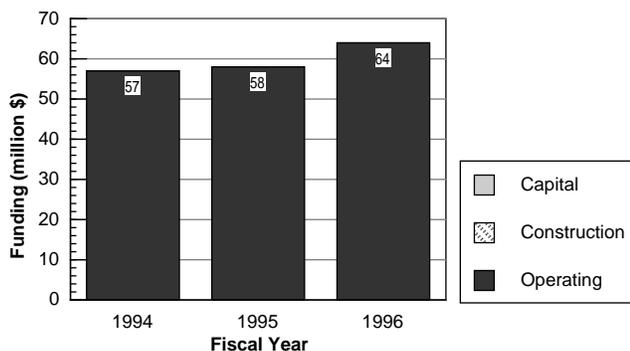
Principal Laboratories: FNAL, LBNL, SLAC
Contributing Laboratories: BNL
Participating Laboratories: ANL, LANL, LLNL, ORNL

Mission Activity Description

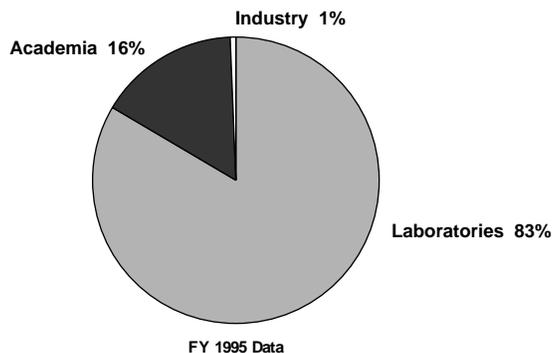
Research in high-energy physics is directed at understanding the nature of matter and energy at the most fundamental level, and the basic forces that govern all processes in nature. The primary goal of the program is to acquire new knowledge and understanding. To carry out this forefront basic research, the program develops advanced technologies for application to accelerators and detectors and new, highly sophisticated approaches to data reduction and analysis. Such technologies often find near-term as well as long-term applications in other fields.

The High-Energy Technology activity performs the specialized advanced technology research and development (R&D) required to sustain and extend the technology base and provide operational support for the highly specialized accelerators, colliding beams facilities, and detector facilities that are essential to the overall high-energy physics program goal of carrying out forefront research. The objectives of this subprogram are to carry out R&D in support of existing accelerator and detector facilities aimed at maintaining and improving their performance parameters and cost effectiveness; carry out R&D in support of planned and proposed projects to maximize their performance goals and cost-effectiveness; carry out R&D to transfer new concepts and technologies into practical application in the high-energy physics context; and carry out R&D to search for and develop new concepts and ideas that could lead to significant enhancements of research capabilities or to significant cost savings in the construction and operation of new facilities.

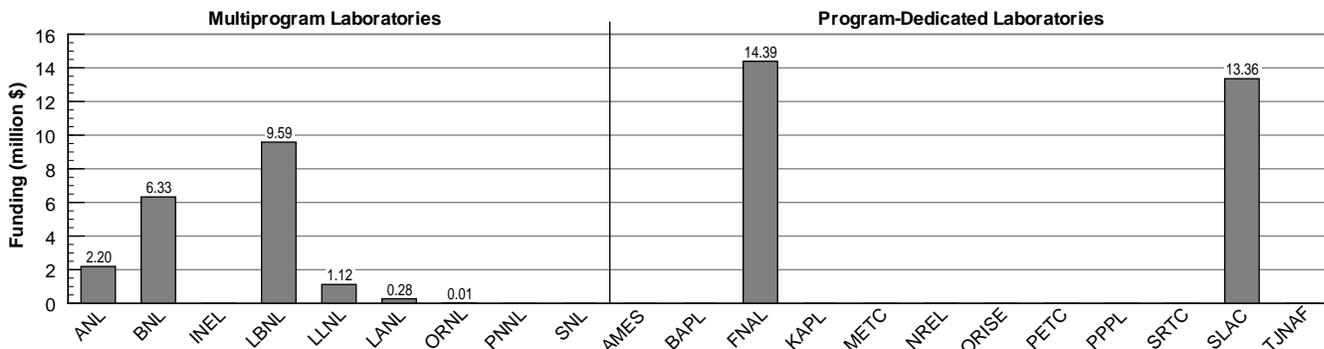
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Medium-Energy Nuclear Physics

Department of Energy Program

Program: Energy Research
Office: High-Energy Nuclear Physics
Element: Nuclear Physics
B&R Code: KB01

Laboratory Complex

Principal Laboratories: LANL, TJNAF
Contributing Laboratories: None
Participating Laboratories: ANL, BNL, LLNL

Mission Activity Description

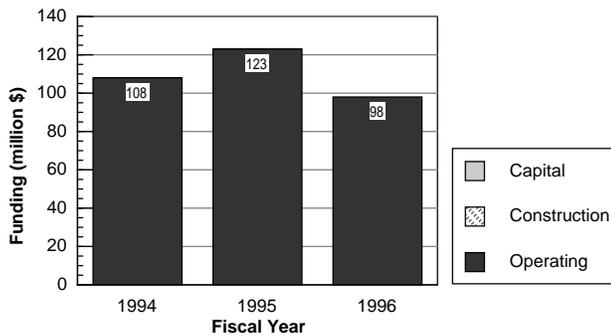
The Medium-Energy Nuclear Physics activity supports academic fundamental research, and operations and research at electron and proton accelerator facilities at the higher energies of interest to nuclear physics. In addition, the activity supports research at accelerators operated by other Department of Energy programs (for example, High-Energy Physics and Basic Energy Sciences) and at other unique domestic or foreign facilities.

Two national accelerator facilities are now operated entirely under the medium-energy activity—the Thomas Jefferson National Accelerator Facility (TJNAF) in Newport News, Virginia, and the Bates Linear Accelerator Center in Middleton, Massachusetts. These accelerator facilities serve a nationwide community of DOE and National Science Foundation-supported scientists from more than 100 American institutions, of which more than 90 percent are universities.

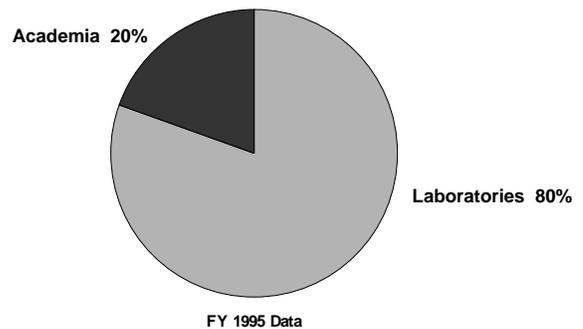
Foreign scientists collaborate in the research programs at both facilities. The research program at the new TJNAF, for example, involves 540 scientists from 17 foreign countries; 81 of these scientists are from Centre European de Recherche Nucleaire (CERN) member states. At TJNAF, foreign collaborators have also made major investments in experimental equipment.

The research programs supported at these facilities are ultimately aimed at achieving an understanding of the structure of the atomic nucleus in terms of quarks and gluons, the objects that apparently combine in different ways to make all the other subatomic particles. Just as important is the achievement of an understanding of the “strong force,” one of only four forces in nature, which holds the nucleus of the atom together. Research efforts include studies of the role of excited states of protons and neutrons in nuclear structure, investigations of the role of specific quarks in the structure of protons and neutrons, studies of the symmetries in the behavior of the laws of physics, investigations of how the properties of protons and neutrons change when imbedded in the nuclear medium, measurements with beams of electrons or protons whose “spins” have all been lined up in the same direction (polarizing the beams) to determine unique “structure functions” that pin down particular models of nuclear structure, and studies of how particles interact inside the nucleus.

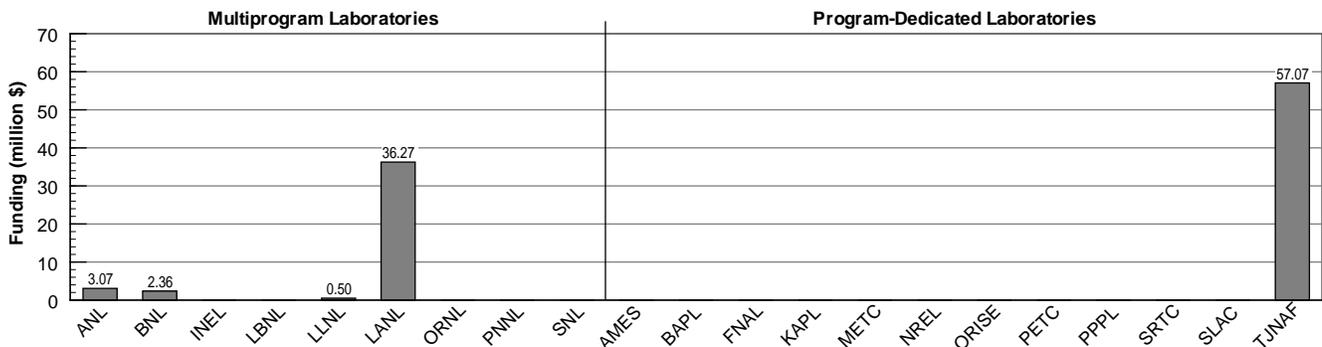
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Heavy-Ion Nuclear Physics

Department of Energy Program

Program: Energy Research
Office: High-Energy and Nuclear Physics
Element: Nuclear Physics
B&R Code: KB02

Laboratory Complex

Principal Laboratories: ANL, BNL, LBNL
Contributing Laboratories: None
Participating Laboratories: LANL, LLNL, ORNL

Mission Activity Description

The Heavy-Ion Nuclear Physics subprogram supports research directed at understanding the properties and behavior of atomic nuclei and nuclear matter over a wide range of conditions. These conditions are created in nucleus-nucleus collisions using beams of heavy ions.

Nuclear Structure and Reaction Studies

At low bombarding energies, research is focused on the study of nuclei that are only gently excited (cool nuclear matter), but taken to their limits of deformation by causing the nuclei to spin extremely rapidly, and to their limits of stability by adding or subtracting protons (or neutrons) to form short-lived, proton-rich (or neutron-rich) nuclei. With higher energy heavy-ion beams, sufficient energy can be transferred into a nucleus so that very highly excited nuclei (warm nuclear matter) can be formed and studied.

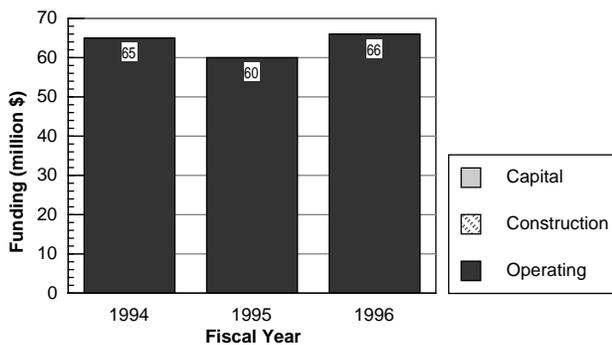
Relativistic Heavy-Ion Research

At relativistic bombarding energies, the properties and behavior of hot dense nuclear matter are studied, with a goal of observing the deconfinement of normal hadronic matter into a new form of matter, a quark-gluon plasma. The Relativistic Heavy-Ion Collider (RHIC), under construction at BNL, will be the world's premier facility for these investigations.

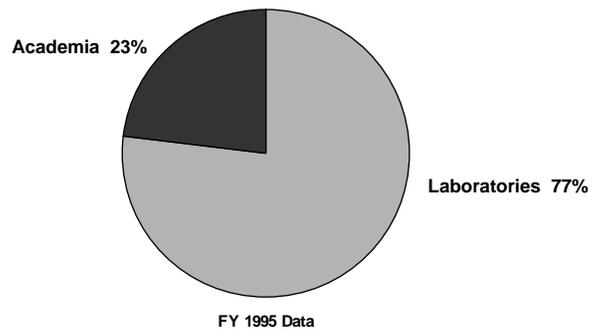
Heavy-Ion Facility Operations and Research and Development

Accelerators located at two universities (Texas A&M and Yale) and three national laboratories (ANL, BNL, and LBNL) are supported and maintained by the heavy-ion nuclear physics subprogram for these studies. The national laboratory facilities are utilized by Department of Energy, National Science Foundation, and foreign-supported researchers whose experiments undergo peer review by program advisory committees prior to approval for beam time.

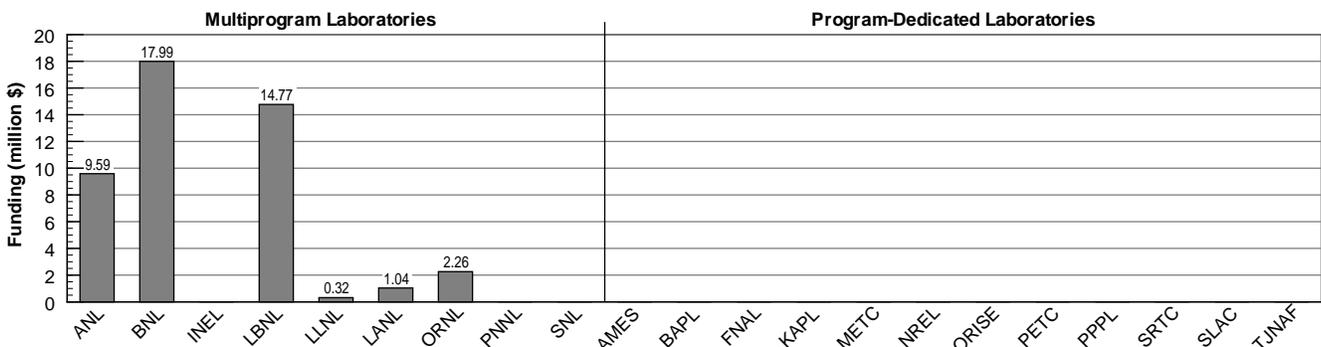
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Nuclear Theory

Department of Energy Program

Program: Energy Research
Office: High-Energy and Nuclear Physics
Element: Nuclear Physics
B&R Code: KB03

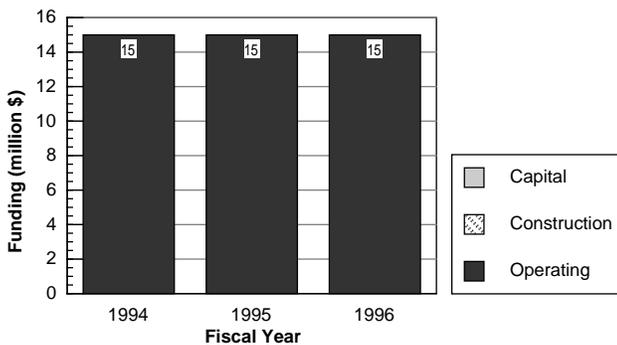
Laboratory Complex

Principal Laboratories: BNL
Supporting laboratories: ANL, LANL, LBNL, ORNL, TJNAF
Participating Laboratories: LLNL

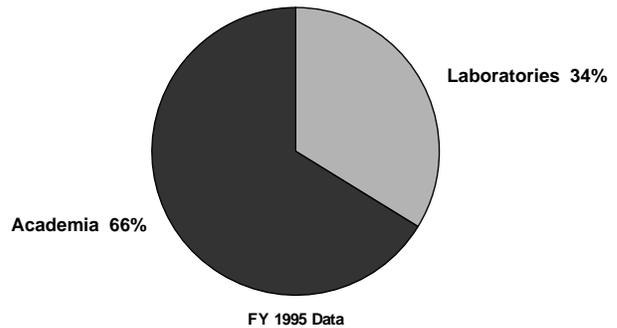
Mission Activity Description

Theoretical Nuclear Physics is a program of fundamental science research to provide new insight into the observed behavior of atomic nuclei. The understanding of nuclear phenomena is prerequisite to understanding the material foundations of the world around us and in our universe. The research ranges from relating the description of elementary constituent particles and the fundamental forces connecting them, to accounting for the collective interactions of nuclei as a whole. The long-range objectives of the Nuclear Theory subprogram are to obtain a comprehensive understanding of the character and structure of nuclear matter at the most fundamental level in terms of the properties of the constituent quarks and gluons, and using this knowledge to further define the relationships between the nucleons embedded in the environment of the nucleus as a whole. Nuclear theory research at universities and national laboratories entails individual efforts that transcend subcategories of nuclear physics. The graduate students and postdocs supported in the Theoretical Nuclear Physics program are highly trained in technical problem-solving techniques and have the flexibility to broadly enhance the Nation's scientific and technical literacy.

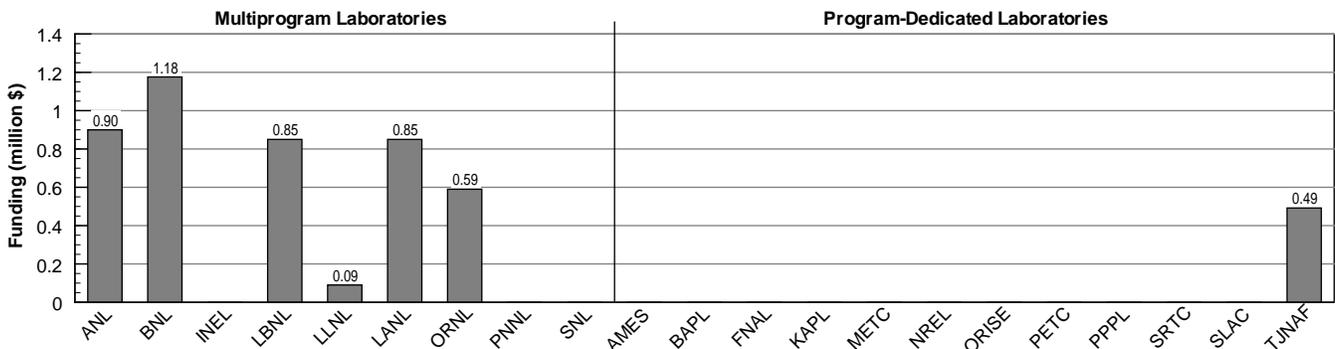
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Low-Energy Nuclear Physics

Department of Energy Program

Program: Energy Research
Office: High-Energy and Nuclear Physics
Element: Nuclear Physics
B&R Code: KB04

Laboratory Complex

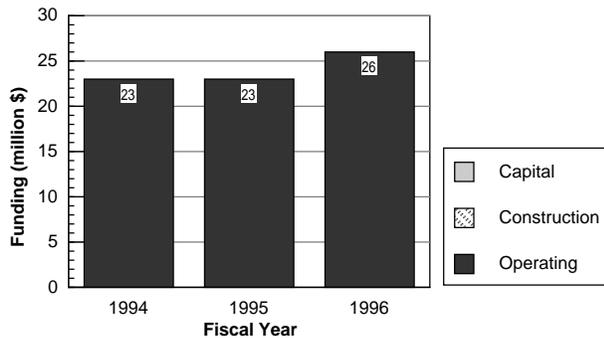
Principal Laboratories: BNL, ORNL
Contributing Laboratories: LBNL
Participating Laboratories: ANL, INEL, LANL, LLNL, ORISE

Mission Activity Description

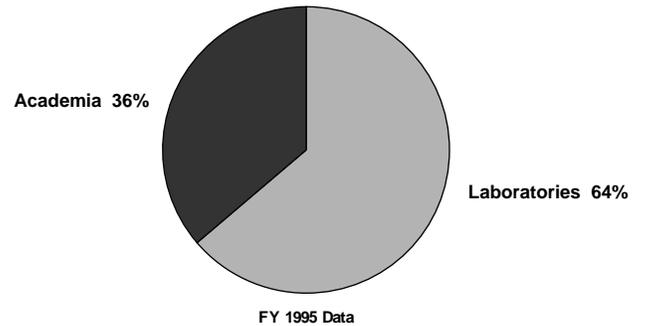
The Low-Energy Nuclear Physics Program supports research addressing issues in nuclear astrophysics, the understanding of the behavior of nucleons at the surface of the nucleus, as well as the collective behavior of the entire ensemble of nucleons acting in consort; nuclear reaction mechanisms; and experimental tests of fundamental symmetries. At present, a major component is the design, construction, and operation of a Radioactive Ion Beams (RIB) facility located at ORNL. Research and service activity topics include:

- **Nuclear Astrophysics**—Astrophysical properties of the Sun are investigated in a joint U.S.-Canadian-British project: the Sudbury Neutrino Observatory. This observatory, a cavity 666 feet in diameter and 110 feet in height, resides 6,800 feet below the Earth's surface. Nuclear reaction rate measurements address theories of the creation of the elements in the "Big Bang."
- **Fundamental Interactions**—Detailed study of the decay of the free neutron, in an experiment termed emit, is being used to investigate the origin and nature of time reversal symmetry violation wherein, contrary to the fundamental laws of classical physics, flow of time can be violated in microscopic systems. This "time reversal symmetry violation" has implications for the fundamental laws of nature and for cosmology.
- **Structure of Nuclei**—Research into the properties of nuclei with uncommon ratios of neutrons to protons is exploring new features of nuclei such as particle emission for ground and excited states. Using special detectors (double sided strip detectors) at different RIB facilities, proton emitters are being identified in some of the heaviest elements as well as the study of competition between gamma ray emission and particle emission from nuclei.
- **Nuclear Information Services**—This activity provides compilation and dissemination of an accurate and complete nuclear data information base that is readily accessible and user oriented. The National Nuclear Data Center at BNL is the central point for U.S. and international coordination.

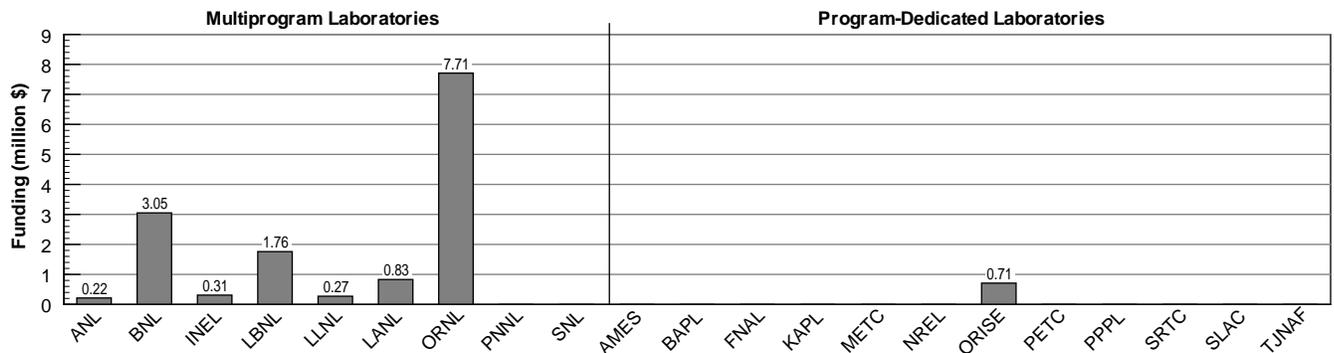
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Energy Research Technology Transfer

Department of Energy Program

Program: Energy Research
Office: Energy Research
Element: Technology Transfer
B&R Code: KU01, KU02

Laboratory Complex

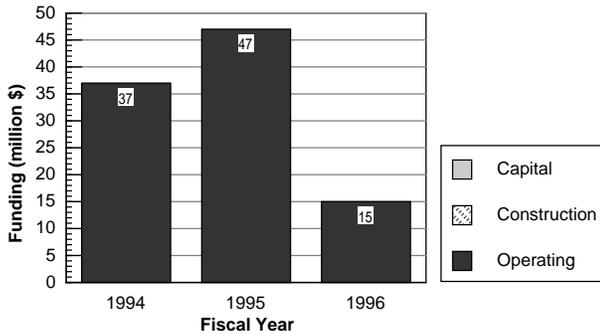
Principal Laboratories: ORNL, LBNL
Contributing Laboratories: ANL, BNL, PNNL
Participating Laboratories: Ames, TJNAF

Mission Activity Description

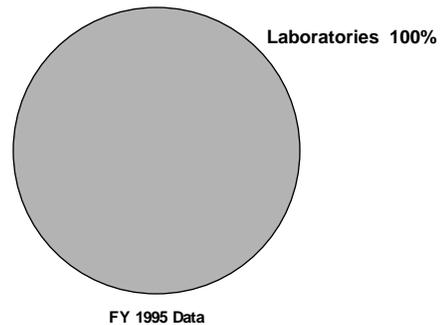
The Energy Research Laboratory Technology Research Program links the Energy Research basic science programs, conducted at the national laboratories, to applied technologies. This is achieved through the leveraged application of laboratory-funded research and development with resources provided by nonprofit institutions, academia, and the private sector. This results in the formation of cost-shared high-risk research collaborations. The following are the program's key goals:

- Reduce technical risk of leading-edge research projects to a point where feasibility can be shown such that applied programs or industry will pursue development on their own
- Provide cost-effective and responsive access to Energy Research laboratory expertise for nonprofit institutions, academia, and the private sector, particularly small businesses
- Increase the core competency knowledge base of the Energy Research laboratories by providing benefit back to the basic science programs

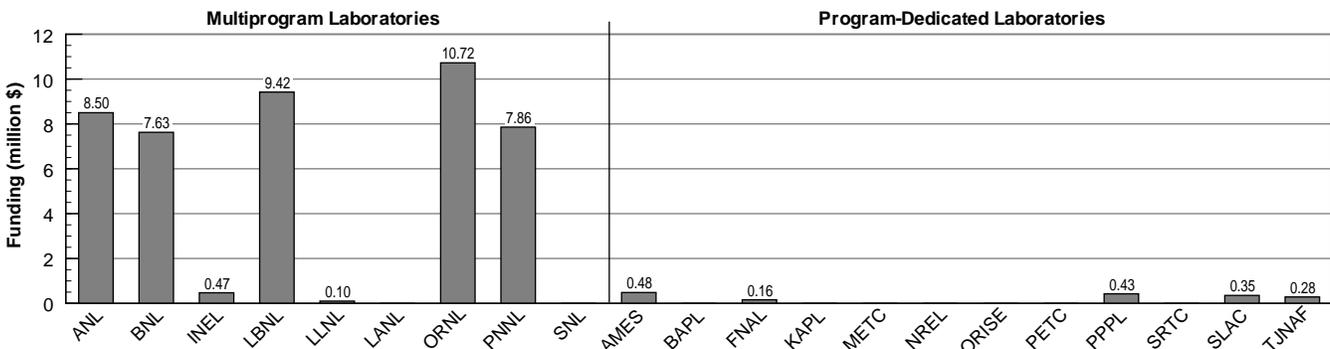
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Applied Physics and Technology

Department of Energy Program

Program: Energy Research
Office: Fusion Energy
Element: Magnetic Fusion Energy
B&R Code: AT05

Laboratory Complex

Principal Laboratory: LLNL
Contributing Laboratories: ORNL, PPPL
Participating Laboratories: ANL, INEL, LANL, LBNL, ORISE

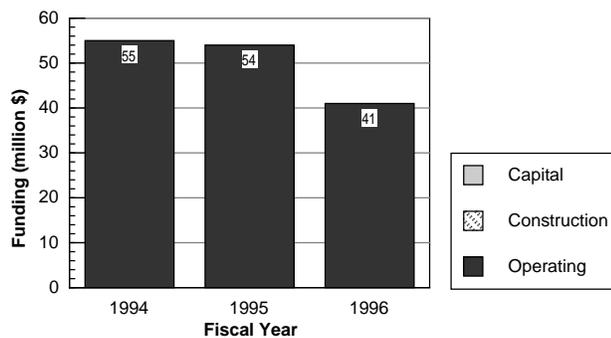
Mission Activity Description

The magnetic fusion program is focused on developing the information that is necessary for the design, construction, and operation of a tokamak fusion powerplant.

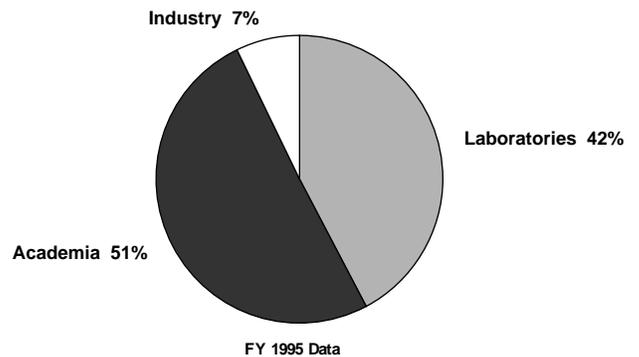
The Applied Plasma Physics activity focuses on the fundamental understanding of plasma behavior in magnetic confinement devices, work that addresses the ignition and burn of a plasma, concept optimization as well as issues that are of critical importance in the development of fusion energy. Ongoing research includes:

- Development of theories and models of plasma behavior in various confinement geometries with heavy emphasis on the leading candidate—the tokamak.
- Development of new approaches in the design and operation of toroidal devices, with emphasis on concepts with powerplant potential or the elucidation of tokamak behavior.
- Support of small- to medium-sized experiments that carry out this research cost-effectively, usually at universities.
- Development of computer codes for analysis and interpretation of data from all the fusion experiments.

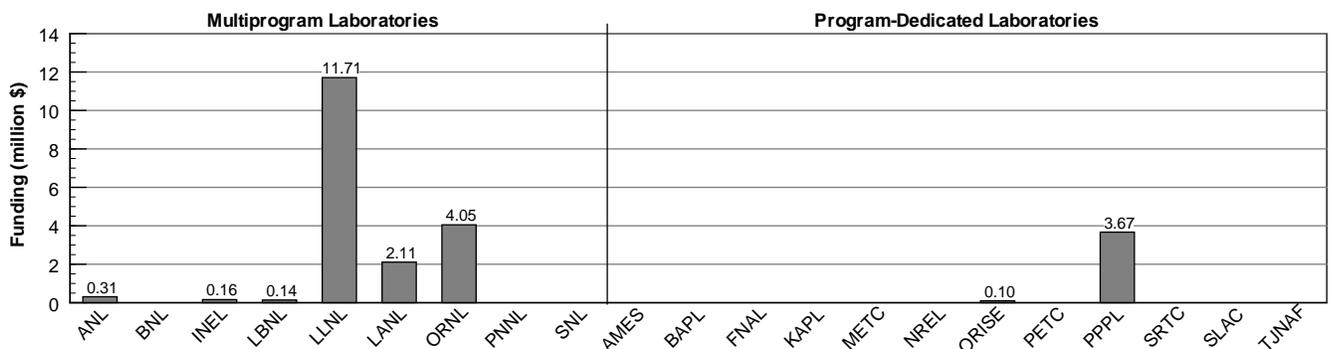
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Confinement Systems

Department of Energy Program

Program: Energy Research
Office: Fusion Energy
Element: Magnetic Fusion Energy
B&R Code: AT10

Laboratory Complex

Principal Laboratory: PPPL
Contributing Laboratories: None
Participating Laboratories: ANL, INEL, LANL, LLNL, ORNL, SNL

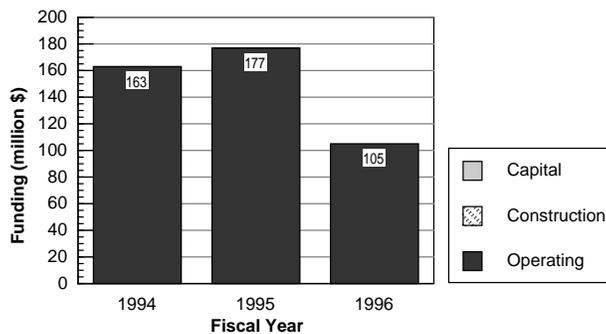
Mission Activity Description

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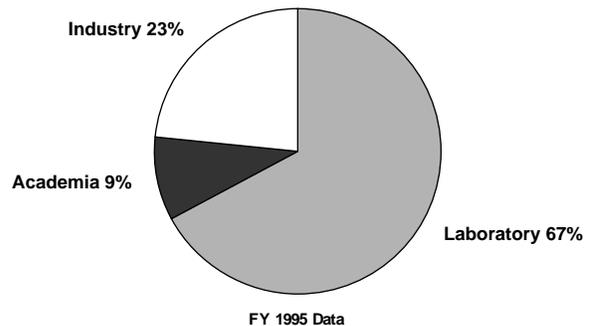
Confinement Systems activities focus on the study of the magnetic confinement of hot plasma in experimental devices of a size and scale relevant to a fusion power plant. This work supports the goal of the U.S. Magnetic Fusion Energy Program to develop fusion powerplants as a technically and economically credible energy source for the 21st century. Ongoing ignition and burn and concept improvement research topics include:

- **Energy Confinement**—Energy confinement is an important physics issue for future fusion devices (for example, the International Thermonuclear Experimental Reactor, or ITER) for achieving a self-sustaining fusion reaction (ignition).
- **Plasma Heating**—Research of technologies (for example, neutral beams and/or radio-frequency waves) to heat the plasma to understand its behavior in order to improve energy confinement.
- **Plasma Equilibrium and Stability**—Research on equilibrium and stability is concentrated on developing designs and operating conditions that theory predicts will maximize the plasma pressure confined by practical magnets.
- **Power Exhaust**—The most critical design issue for the next-generation devices is power exhaust/particle control. Both alpha particles (helium nuclei) and large amounts of energy generated by fusion reactions must be exhausted from the vacuum vessel and the deuterium-tritium fuel must be replenished. Research is under way to develop methods to remove both the plasma power and the leftover alpha particles with minimal impurity generation.

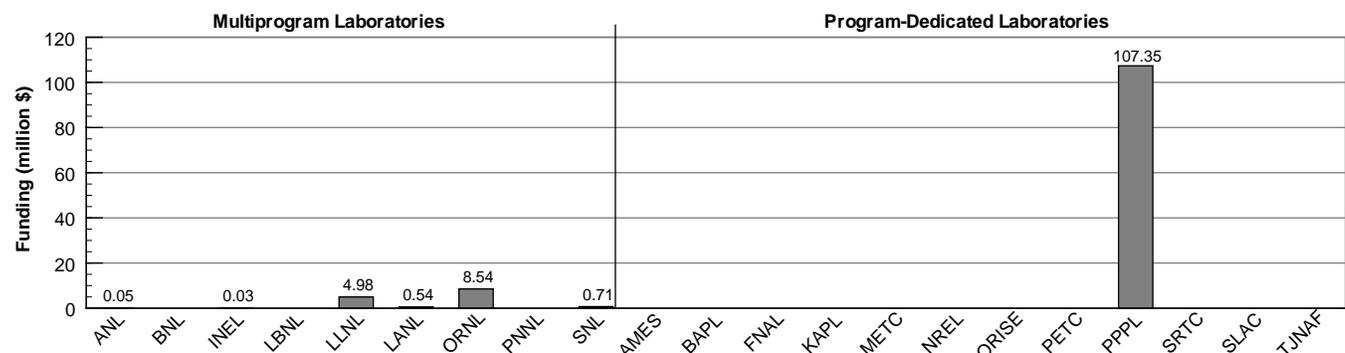
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



ITER and Technology Development

Department of Energy Program

Program: Energy Research
Office: Fusion Energy
Element: Magnetic Fusion Energy
B&R Code: AT15

Laboratory Complex

Principal Laboratory: ORNL
Contributing Laboratories: ANL, LLNL, SNL
Participating Laboratories: BNL, INEL, LANL, ORISE, PNNL, PPPL

Mission Activity Description

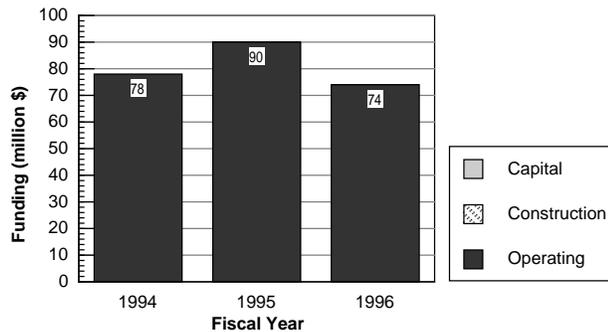
The ITER and Technology Development activity conducts research and development to establish the information and technology data necessary for current and future fusion facilities and projects, including the International Thermonuclear Experimental Reactor (ITER).

The ITER program is being carried out by the European Union, Japan, the Russian Federation, and the United States to design ITER and conduct research and development that will allow the four parties to decide whether to proceed into the construction phase. The ITER device is intended to demonstrate the scientific and technological feasibility of fusion.

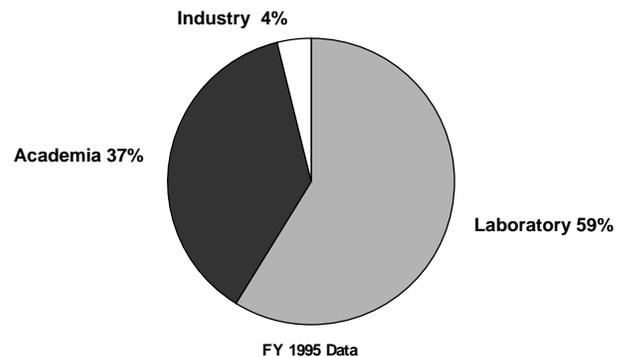
The ITER and Technology Development activity includes:

- Selection and development of materials and the testing of effects of radiation and heat on components and the removal of heat in fusion systems for ITER.
- Development of superconducting magnets to confine and control the plasma location and shape.
- Safety and environmental attractiveness, maintenance, reliability and quality assurance of ITER and other fusion applications.
- Fusion fuel-cycle development, including the development of methods of ensuring that a fusion reactor will be self-sustaining in tritium, cleanup and recycling of fusion plasma exhaust, and reinjection of the fusion fuel into the fusion plasma.
- Plasma heating and current drive systems to provide the heat to initiate the fusion reaction and to control the dynamics of and current distribution within the reacting fusion plasma.
- Plasma interactions with material surfaces that surround the plasma so that the surfaces can withstand contact with the plasma and that material from the walls does not adversely affect the plasma.

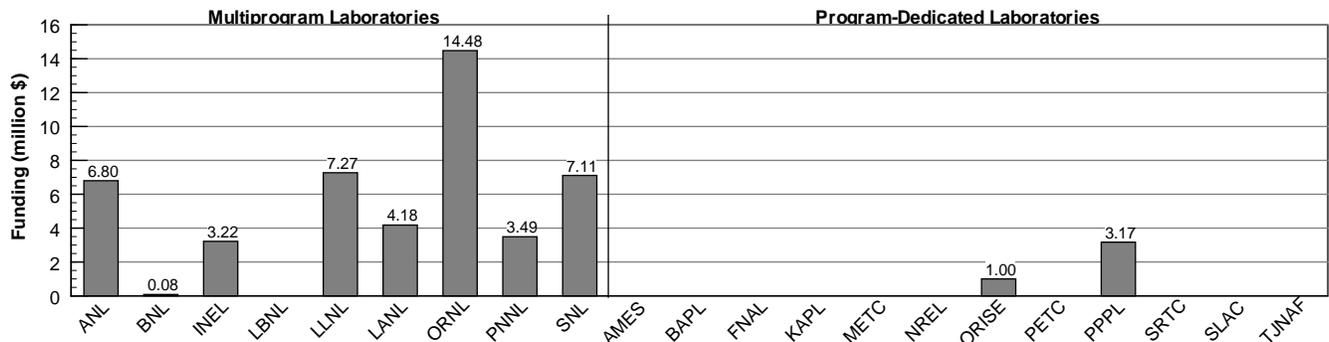
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Ion Driver Research

Department of Energy Program

Program: Energy Research
Office: Fusion Energy
Element: Inertial Fusion Energy
B&R Code: AT2510

Laboratory Complex

Principal Laboratory: LBNL
Contributing Laboratories: LLNL
Participating Laboratories: None

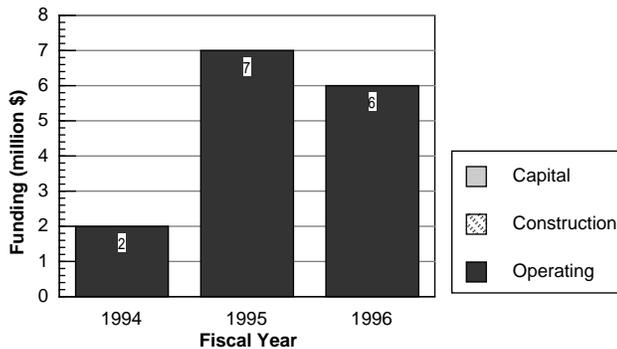
Mission Activity Description

The Inertial Fusion Energy (IFE) activities focus on obtaining fundamental information needed for the design of a demonstration powerplant based on the concept of a small pellet filled with deuterium and tritium that is compressed by heavy ions produced in a high-energy accelerator.

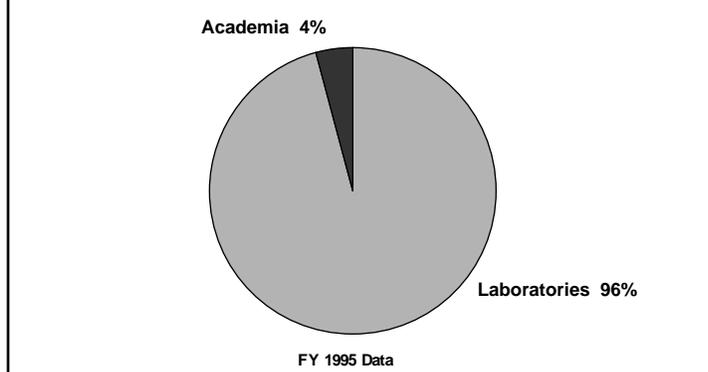
Development of inertial fusion as an energy source requires specific underpinning technical information. First, the amount and nature of energy required to initiate thermonuclear burn of laboratory targets must be determined. An important part of this information is how much gain, or energy multiplication, can be obtained from laboratory inertial fusion. This ignition and gain information is expected to come from the target physics program and the National Ignition Facility carried out under Defense Programs within DOE. Second, a high-intensity energy source (driver) that has high efficiency and can be reliably pulsed several times per second must be developed in order to use laboratory ignition in energy applications. A heavy-ion accelerator has been consistently identified as the best candidate driver. The inertial fusion energy program will conduct the physics tests of the heavy-ion beam concept. The inertial fusion program consists of three activities: ion-driver research, chamber propagation, and target design.

Ion Driver Research aims to resolve the physics issues of the acceleration and transport of intense heavy ion beams that can be tightly focused. Ongoing research topics include beam-current amplification and the electric and magnetic transport of intense ion beams.

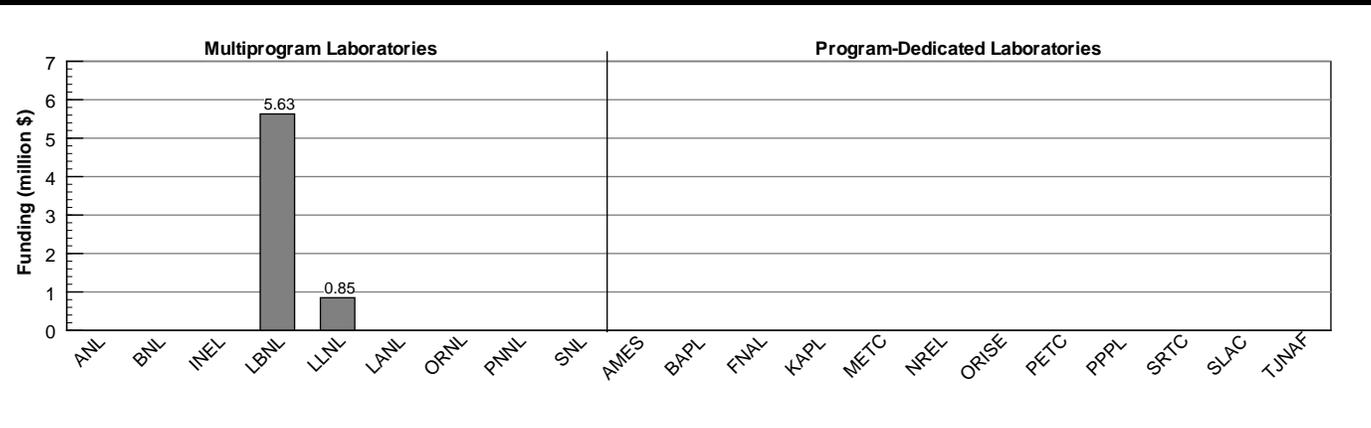
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Chamber Propagation

Department of Energy Program

Program: Energy Research
Office: Fusion Energy
Element: Inertial Fusion Energy
B&R Code: AT2540

Laboratory Complex

Principal Laboratories: LLNL
Contributing Laboratories: PPPL
Participating Laboratories: SLAC

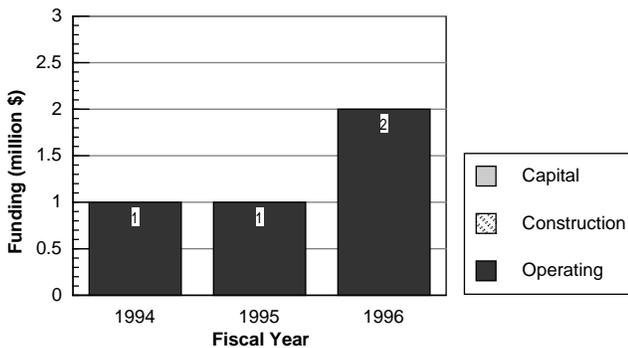
Mission Activity Description

The Inertial Fusion Energy (IFE) activities focus on obtaining fundamental information needed for the design of a demonstration powerplant based on the concept of a small pellet filled with deuterium and tritium that is compressed by heavy ions produced in a high energy accelerator.

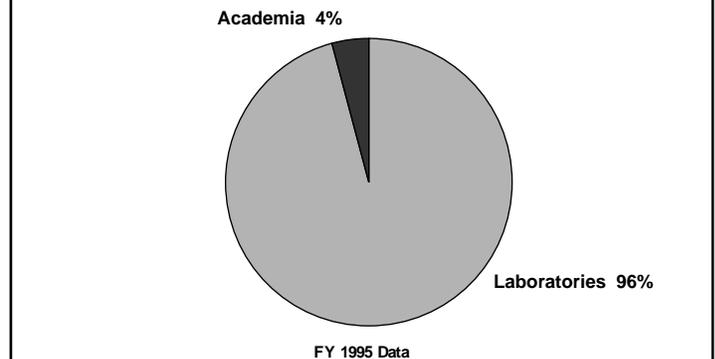
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In the Chamber Propagation element, experiments and reliable computer simulations are being developed for understanding the focusing and transport of intense, high energy ion beams onto millimeter-sized targets under the partial vacuum conditions expected in a fusion chamber.

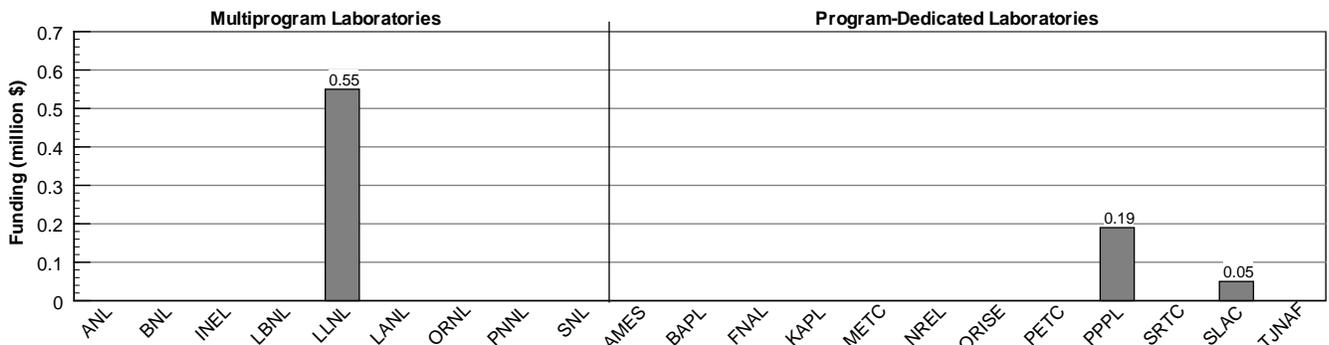
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Target Design

Department of Energy Program

Program: Energy Research
Office: Fusion Energy
Element: Inertial Fusion Energy
B&R Code: AT2550

Laboratory Complex

Principal Laboratories: LLNL
Contributing Laboratories: None
Participating Laboratories: None

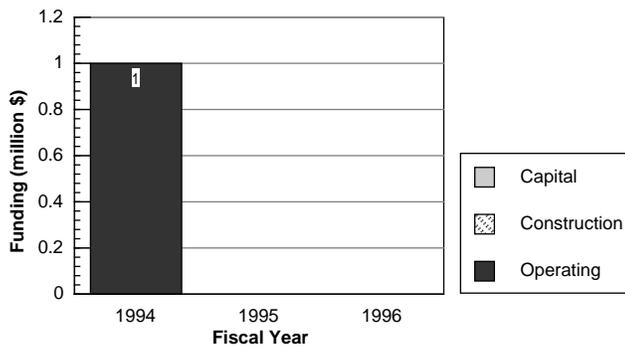
Mission Activity Description

The Inertial Fusion Energy (IFE) activities focus on obtaining fundamental information needed for the design of a demonstration powerplant based on the concept of a small pellet filled with deuterium and tritium that is compressed by heavy ions produced in a high energy accelerator.

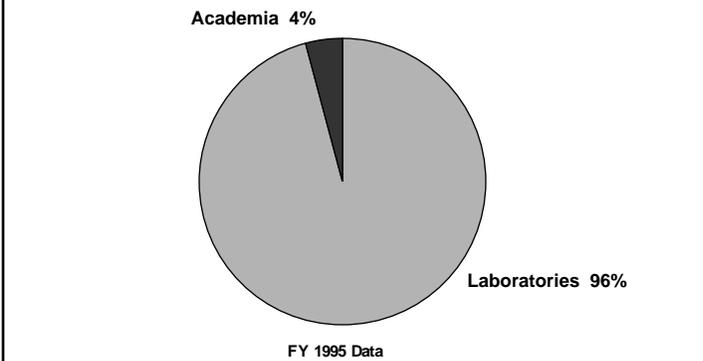
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The IFE Target Design element focuses on the design of low-cost, high-yield, cryogenic targets for heavy ion beam systems. Heavy ion beams are being designed in close collaboration with the Department's Office of Defense Programs.

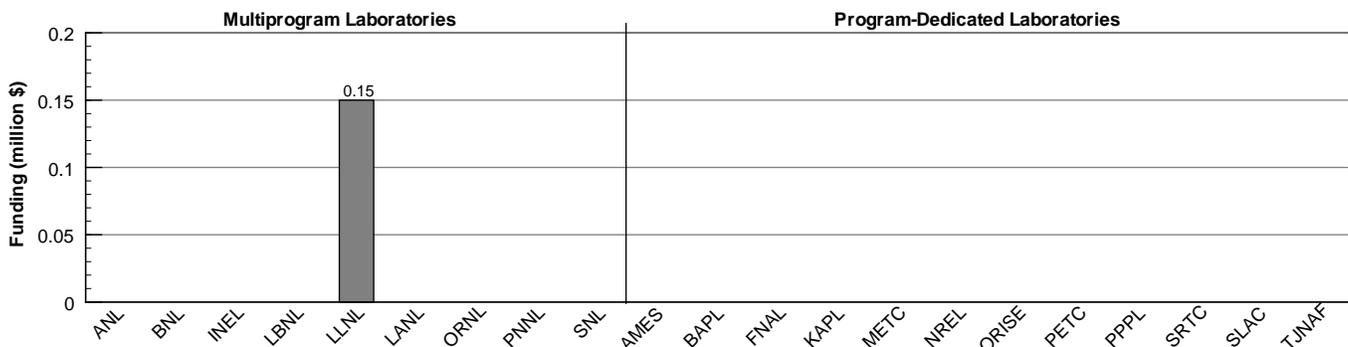
Funding History



Laboratory-Academia-Industry Participation



Fiscal Year 1995 Funding Profile



Note: Because of rounding 1995 Funding does not appear in Funding History graph