

**DEPARTMENT OF ENERGY
FY 1999 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
SCIENCE**

(Tabular dollars in thousands, Narrative in whole dollars)

COMPUTATIONAL AND TECHNOLOGY RESEARCH

PROGRAM MISSION

The mission of the Computational and Technology Research (CTR) program is to perform long-term computational, technology, and advanced energy projects research in support of the goals of the Office of Energy Research strategic plan, and the mission of the Department of Energy (DOE).

The GOAL of the CTR program is:

To address complex problems important to the mission of the Department of Energy and to the nation, through an integrated program in applied mathematical sciences, high performance computing and communications, information infrastructure, advanced energy projects research, and technology research. Research at the forefront of scientific research is becoming more multidisciplinary and fast-paced, calling for new approaches. The CTR program emphasizes multidisciplinary research, often with federal and private sector partners. The program exploits the capabilities and research skills at universities, national laboratories, and industrial research laboratories. The CTR program funds research that extends from fundamental investigations to technology development. This includes activities such as High Performance Computing and Communications, the National Information Infrastructure, inter-agency development of the Next Generation Internet, and the joint Energy Research-Defense Programs DOE 2000 initiative. The program also explores advanced energy concepts to establish their scientific feasibility. Technology research activities include multi-year collaborations and technical assistance to small business. The program works closely with other Energy Research, Departmental, and other agency programs.

PROGRAM MISSION - COMPUTATIONAL AND TECHNOLOGY RESEARCH (Cont'd)

The OBJECTIVES related to these goals are:

1. To **CONTRIBUTE TO SUSTAINABLE ENERGY PRODUCTION AND USE** - Conduct research that creates scientific and engineering knowledge in support of Department of Energy mission thrusts to accelerate the utilization and development of energy technologies in a safe and environmentally compatible manner.
2. To **PROVIDE WORLD CLASS COMPUTING FACILITIES** - Provide and operate major user supercomputer facilities including wide area networks needed for DOE research and foster research partnerships with industry and the entire scientific community. These facilities include the National Energy Research Scientific Computing (NERSC) Center at Lawrence Berkeley National Laboratory, the Energy Sciences Network (ESnet), and specialized High Performance Computing Resource Providers (HPCRP) at Los Alamos National Laboratory, Oak Ridge National Laboratory, Lawrence Berkeley National Laboratory, and Argonne National Laboratory. Thousands of scientists and engineers use these facilities to advance knowledge and develop new products, materials, and manufacturing processes.
3. To **ENSURE THAT RESEARCH RESULTS ARE WIDELY KNOWN, VALUED AND USED** - Promote open communications and the transfer of information and technology among universities, government, and the private sector. Activities include peer-review of research activities, presentation of results at meetings and in peer-reviewed scientific journals, strong coordination and planning with the energy technology offices of the Department, co-location of researchers with partner programs, input from stakeholders, and in-depth workshops and conferences among scientists and engineers with management sponsorship and participation. The national laboratories and universities are unique resources to bring about many of these important interactions.

MAJOR ACTIVITIES:

1. Mathematical, Information, and Computational Sciences:
Supports forefront, diverse applied mathematical sciences, high performance computing, communications and information infrastructure research that spans the spectrum of activities from strategic fundamental research to technology development and demonstration.
2. Laboratory Technology Research:
Supports high risk, long-term technology research that advances basic research results to a stage where industry and DOE technology

programs can exploit the technologies for improved energy utilization and efficiency.

PROGRAM MISSION - COMPUTATIONAL AND TECHNOLOGY RESEARCH (Cont'd)

3. Advanced Energy Projects:

Supports fundamental research to establish the feasibility of novel, high risk/high payoff energy-related concepts that span the Department's energy mission and goals.

SCIENTIFIC FACILITIES UTILIZATION:

The Computational and Technology Research program request includes \$26,500,000 in FY 1999 to support the NERSC Center. This investment will provide research time for about 5,000 scientists in universities, Federal agencies, and U.S. companies. It will also leverage both Federally and privately sponsored research, consistent with the Administration's strategy for enhancing the U.S. National science investment. The proposed funding supports the number of users served in FY 1997, and will maintain the quality of service and availability of facility resources to users, including university and government scientists, as well as private companies who rely on unique DOE facilities for their basic research needs. The proposed funding level will also provide for efficient utilization of high technology facilities, which are generally oversubscribed by factors of two to three. Research communities that will benefit from this initiative include structural biology, superconductor technology, medical research and technology development, materials, chemical and plasma sciences, high energy and nuclear physics, and environmental and atmospheric research.

PERFORMANCE MEASURES:

The Computational and Technology Research program performs three different types of activities: operate facilities that provide service for ER and DOE; conduct basic research in areas such as computational science, mathematics, and advanced energy principles; and perform technology research to bridge the gap between basic research and industrial needs.

Facilities Operations: Facilities and infrastructure including the NERSC Center and ESnet are operated to meet user and overall ER program requirements. Facility performance measures include achievement of performance specifications, operating time, throughput, user satisfaction and effective utilization of resources as determined by reports from external review panels, user steering committees, and internal ER program manager committees. The development and upgrade of scientific facilities will be kept on schedule and within cost, not to exceed 110 percent of estimates. The operating time lost at scientific facilities due to unscheduled downtime will be less than 10 percent

PROGRAM MISSION - COMPUTATIONAL AND TECHNOLOGY RESEARCH (Cont'd)

of the total scheduled possible operating time, on average. A review panel of users will review and judge the operation of the computer facilities and networks to determine that they have successfully met 75 percent of their requirements.

Basic Research: The scientific and technical merit, appropriateness, and quality of the Computational and Technology Research programs are judged by rigorous peer reviews conducted by internationally recognized scientific experts. High quality research is assured based on the results of periodic peer reviews by experts in the field. Other measures of the quality of the research are sustained achievements in advancing knowledge, as indicated by publication of research results in refereed scientific journals and by invited participation at national and international conferences and workshops; and by awards received by CTR supported researchers.

Bridging Technology Gap: The purpose of the Laboratory Technology Research (LTR) subprogram, and a subgoal of the Advanced Energy Projects (AEP) subprogram, is to bridge from basic research to the point where industry and DOE's technology programs can exploit the innovations for energy applications. Accordingly, performance is judged by the number of supported projects and concepts that are subsequently supported or implemented by either industry or DOE's technology programs, and the economic and commercial impact of products and processes resulting from the projects, as indicated, for example by R&D 100 Awards.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- o In FY 1997, the DOE 2000 initiative began significant multi-laboratory software development efforts in Advanced Computational Testing and Simulation as well as National Collaboratory technology. In addition, two National Collaboratory pilot project partnerships: the Diesel Combustion Collaboratory and the Materials MicroCharacterization Collaboratory were started in FY 1997.
- o The second phase of the Grand Challenge program was initiated in FY 1997 in partnership with all other ER program offices and other DOE program offices. A number of the grand challenge teams will use the technologies developed in DOE 2000.
- o The CTR program won 5 of the 36 1997 R&D 100 Awards received by DOE programs. Three of these awards were won by the AEP and LTR subprograms, and two were won by the MICS subprogram.
- o The CTR program will complete prototype development of the "virtual lab" approach and implement at least three program trial applications.

PROGRAM MISSION - COMPUTATIONAL AND TECHNOLOGY RESEARCH (Cont'd)

- o The FY 1999 request also includes funding for the Department's participation in the President's Next Generation Internet (NGI) Initiative. This initiative, which involves a number of Federal agencies, has three goals: (1) promote experimentation with the next generation of networking technologies; (2) develop a next generation network testbed to connect universities and Federal research institutions at rates that demonstrate new networking technologies and support future research; and (3) demonstrate new applications that meet important national goals and missions. This initiative will leverage previous MICS investments in ESnet and other advanced networking technologies.

Funding of Contractor Security Clearances

- o In FY 1999, the Department will divide the responsibility for obtaining and maintaining security clearances. The Office of Security Affairs, which has been responsible for funding all Federal and contractor employee clearances, will pay only for clearances of Federal employees, both at headquarters and the field. Program organizations will be responsible for contractor clearances, using program funds. This change in policy will enable program managers to make the decisions as to how many and what level clearances are necessary for effective program execution. In this way, it is hoped that any backlog of essential clearances which are impeding program success can be cleared up by those managers most directly involved. The Office of Energy Research is budgeting \$46,000 for estimated contractor clearances in FY 1999 within this decision unit.

COMPUTATIONAL AND TECHNOLOGY RESEARCH
PROGRAM FUNDING PROFILE
(Dollars in thousands)

<u>Subprogram</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1998 Original Appropriation</u>	<u>FY 1998 Adjustments</u>	<u>FY 1998 Current Appropriation</u>	<u>FY 1999 Budget Request</u>
Mathematical, Information, and Computational Sciences	\$ 114,804	\$ 127,490	\$ -280 a/	\$ 127,210	\$ 141,311
Laboratory Technology Research.....	23,666	15,829	-35 a/	15,794	16,329
Advanced Energy Projects.....	11,398	7,588	-16 a/	7,572	3,000
Subtotal, Computational and Technology Research.....	<u>149,868</u>	<u>150,907</u>	<u>(331) a/</u>	<u>150,576</u>	<u>160,640</u>
Adjustment.....	-2,580 b/	-1,713 c/	0	-1,713 c/	0
Adjustment.....	<u>0</u>	<u>-331 a/</u>	<u>331 a/</u>	<u>0</u>	<u>0</u>
TOTAL, CTR.....	<u>\$ 147,288</u> d/	<u>\$ 148,863</u>	<u>\$ 0</u>	<u>\$ 148,863</u>	<u>\$ 160,640</u>

a/ Share of Science general reduction for contractor training.

b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program (\$2,522,000 and FY 1997 emergency flood supplemental rescission (\$58,000). The total general reduction is applied at the appropriation level.

c/ Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

d/ Excludes \$3,430,000 which has been transferred to the SBIR program and \$202,000 which has been transferred to the STTR program.

Public Law Authorization:

Public Law: 95-91, DOE Organization Act

COMPUTATIONAL AND TECHNOLOGY RESEARCH
(Dollars in thousands)

PROGRAM FUNDING BY SITE

<u>Field Offices/Sites</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Original <u>Appropriation</u>	FY 1998 <u>Adjustments</u>	FY 1998 Current <u>Appropriation</u>	FY 1999 Budget <u>Request</u>
Albuquerque Operations Office					
Los Alamos National Laboratory	\$15,998	\$13,524	\$0	\$13,524	\$12,084
National Renewable Energy Laboratory	734	498	0	498	0
Sandia National Laboratories	6,286	5,188	0	5,188	3,344
Chicago Operations Office					
Ames Laboratory	3,867	2,240	0	2,240	1,985
Argonne National Laboratory	17,396	15,324	0	15,324	16,615
Fermi National Accelerator Laboratory	0	0	0	0	0
Brookhaven National Laboratory	4,074	2,284	0	2,284	2,617
Princeton Plasma Physics Laboratory	90	90	0	90	0
Oakland Operations Office					
Lawrence Berkeley National Laboratory	48,378	53,678	0	53,678	51,922
Lawrence Livermore National Laboratory	1,605	1,979	0	1,979	530
Stanford Linear Accelerator Center	410	410	0	410	200
Oak Ridge Operations Office					
Oak Ridge Inst. for Science and Tech.	27	135	0	135	0
Oak Ridge National Laboratory	18,563	14,891	0	14,891	8,069
Thomas Jefferson National Accelerator Facility	180	190	0	190	180

<u>Field Offices/Sites</u>	<u>FY 1997 Current Appropriation</u>	<u>FY 1998 Original Appropriation</u>	<u>FY 1998 Adjustments</u>	<u>FY 1998 Current Appropriation</u>	<u>FY 1999 Budget Request</u>
Richland Operations Office					
Pacific Northwest National Laboratory	4,529	3,628	0	3,628	3,621
All Other Sites a/	<u>27,731</u>	<u>36,848</u>	<u>-331</u> b/	<u>36,517</u>	<u>59,473</u>
Subtotal	149,868	150,907	-331 b/	150,576	160,640
Adjustment	-2,580 c/	-1,713 d/	0	-1,713 d/	0
Adjustment	<u>0</u>	<u>-331</u> b/	<u>331</u> b/	<u>0</u>	<u>0</u>
 TOTAL	 \$147,288 e/	 \$148,863	 \$0	 \$148,863	 \$160,640

a/ Funding provided to universities, industry, other Federal agencies and other miscellaneous contractors.

b/ Share of Science general reduction for contractor training.

c/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program (\$2,522,000) and FY 1997 emergency flood supplemental rescission (\$58,000). The total general reduction is applied at the appropriation level.

d/ Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

e/ Excludes \$3,430,000 which was transferred to the SBIR program and \$202,000 which was transferred to the STTR program.

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES
(Tabular dollars in thousands, narrative in whole dollars)**

- I. **Mission Supporting Goals and Objectives:** The Mathematical, Information, and Computational Sciences (MICS) subprogram is a forefront, diverse program in applied mathematical sciences, high performance computing, communications and information infrastructure that 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: (1) the National Collaboratories (NC) thrust that develops tools and capabilities to permit scientists and engineers working at different DOE and other facilities to collaborate on research as easily as if they were in the same building; (2) the Advanced Computational Testing and Simulation (ACTS) thrust that develops an integrated set of algorithms, software tools and infrastructure to enable computer simulation to better complement experiment and theory or to be used in place of experiments when real experiments are too dangerous, expensive, or inaccessible. These two strategic thrusts support the mathematics, computational science, and information technology needs of all DOE technical mission areas (e.g., Fundamental Research, Defense, Energy Efficiency, Fossil Energy, and Environmental programs). The efforts in these areas are closely coordinated with related activities supported by Defense Programs.

The FY 1999 request includes funding for the DOE 2000 initiative. Support for the Advanced Computational Testing and Simulation part of the DOE 2000 initiative will foster advanced computational testing and simulation tools to attack complex technical problems and accelerate applications critical to DOE missions. Support for the National Collaboratory part of the DOE 2000 initiative will develop and test a common technology base that will permit scientists and engineers at various remote sites to simultaneously participate in research at large science facilities. The DOE 2000 initiative is coordinated with parallel research in other agencies through the Committee on Computing, Information, and Communication of the National Science and Technology Council; it extends throughout DOE through partnerships with other DOE programs.

The MICS subprogram also provides supercomputer access and advanced communication capabilities, through the National Energy Research Scientific Computing (NERSC) Center and the Energy Sciences Network (ESnet), to scientific researchers.

The FY 1999 request also includes funding for the Department's participation in the President's Next Generation Internet (NGI) Initiative. This initiative, which involves a number of Federal agencies, has three goals: (1) promote experimentation with the next generation of networking technologies; (2) develop a next generation network testbed to connect universities and Federal research institutions at rates that demonstrate new networking technologies and support future research; and (3) demonstrate new applications that meet important national goals and missions. This initiative will leverage previous MICS investments in ESnet and other advanced networking technologies. At this

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES**

level of funding, DOE's goal one activities will focus on developing and deploying technologies that provide DOE applications greater control and management of the network infrastructure, provide DOE applications greater control and management of the network infrastructure, and provide enhanced network interconnection capabilities to support agency and university collaborations. DOE's participation in goal two is focused on connections to six National Laboratories at 100 times today's Internet and two connections to National Laboratories at 1,000 times today's Internet, as well as enhanced support for some strategic university access to DOE facilities and collaborations. DOE's focus in goal three is the enabling of DOE's applications to utilize goal one technologies immediately in DOE's goal two infrastructure, specifically those applications that require University and Laboratory access to DOE's unique facilities. The National Collaboratory Pilot Projects initiated in FY 1997 would continue as NGI applications.

II. Funding Schedule:

<u>Program Activity</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>\$ Change</u>	<u>% Change</u>
Mathematical, Computational, and Computer Sciences Research	\$ 48,028	\$ 50,548	\$ 52,232	\$+ 1,684	+ 3.3%
Advanced Computation, Communications Research, and Associated Activities. . .	66,776	73,450	85,500	+12,050	+16.4%
SBIR/STTR	<u>0</u>	<u>3,212</u>	<u>3,579</u>	<u>+ 367</u>	<u>+11.4%</u>
Total	<u>\$114,804</u>	<u>\$ 127,210</u>	<u>\$141,311</u>	<u>\$+14,101</u>	<u>+11.1%</u>

III. Performance Summary - Accomplishments:

Mathematical, Computational, and Computer Sciences Research

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
-Research supporting advanced computational testing and simulation including applied mathematics research, computer science and software tools research, grand challenge applications, and computational science education programs. Capital equipment supporting research in advanced computational testing and simulation including computers, storage	\$45,528	\$45,548	\$47,232

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MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES**

III. Performance Summary- Accomplishments:	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
devices and other peripheral equipment. Education activities for improving science education for students and faculty in America's schools, colleges and universities are also funded in this program.			
-Support of the joint Energy Research/Defense Programs Research program started in FY 1997 under the DOE 2000 initiative to develop and begin deployment of integrated sets of advanced computational tools including software frameworks, tools for complex geometries and advanced parallel software to accelerate the accomplishment of DOE missions.	2,500	5,000	5,000
	<hr/>	<hr/>	<hr/>
Total Mathematical, Computational, and Computer 52,232 Sciences Research		48,028	50,548
<u>Advanced Computation, Communications Research, and Associated Activities</u>			
-Research in support of National Collaboratories: high capability networks, information surety, underlying technologies to support national collaboratories, and underlying technologies to support electricity supply and demand management.	6,859	5,936	4,500
-Research under the DOE 2000 initiative to develop and begin deployment of integrated sets of advanced electronic collaboration tools to accelerate the accomplishment of DOE missions by making it as easy for scientists and engineers to work together across the country as if they were in the same building. This effort includes remote operation of experiments at national user facilities.	6,000	6,000	6,000

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES**

III. Performance Summary- Accomplishments:	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
<p>-Research in support of the President's Next Generation Internet Initiative to: (1) promote experimentation with the next generation of networking technologies; (2) develop a next generation network testbed to connect universities and Federal research institutions at rates that demonstrate new networking technologies and support future research; and (3) demonstrate new applications that meet important national goals and missions. The funding is part of a coordinated multi-agency program.</p>	0	0	22,000
<p>-Support for the NERSC Center, which provides high performance computing for investigators supported by the Office of Energy Research. The Center serves more than 5,000 users working on about 700 projects, of which about 35% are university based, 60% are in National Laboratories, and 5% are in industry. The NERSC Center provides a spectrum of supercomputers that offers a range of high performance computing resources and associated software support that is a critical element in the success of many ER research programs. These computational resources are integrated by a common high performance file storage system which facilitates interdisciplinary collaborations. Related capital equipment needs are also supported.</p>	19,130	26,500	26,500
<p>-Support for ESnet operations which provide worldwide access to Energy Research facilities, including: advanced light sources; neutron sources; particle accelerators; fusion reactors; spectrometers; High Performance Computing Resource Providers (HPCRP); and other leading-edge science instruments and facilities. Future upgrades will allow for remote experimentation and remote access to these facilities, as National Collaboratory technologies are developed and deployed. Related capital equipment needs are also supported.</p>	14,787	14,787	14,000

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES**

III. Performance Summary- Accomplishments:	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
<p>-High Performance Computing Resource Providers (HPCRP) at Los Alamos National Laboratory, Argonne National Laboratory, and Lawrence Berkeley National Laboratory which provide the needed leading edge computational hardware testbeds to support grand challenge and advanced computational testing and simulation research. The HPCRP at Oak Ridge National Laboratory will be supported for only six months in FY 1999. Related capital equipment needs are also supported.</p>	20,000	20,227	12,500
<p>Total Advanced Computation, Communications Research & Associated Activities</p>	66,776	73,450	85,500
<p><u>SBIR/STTR Funding</u></p> <p>In FY 1997, \$2,537,000 and \$149,000 were transferred to the SBIR and STTR programs, respectively. The FY 1998 and FY 1999 amounts are the estimated requirement for the continuation of these programs.</p>	0	3,212	3,579
<p>Total Mathematical, Information, and Computational Sciences</p>	\$114,804	\$127,210	\$141,311

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES**

EXPLANATION OF FUNDING CHANGES FROM FY 1998 TO FY 1999:

The increase in Advanced Computational Testing and Simulation Research will enhance the applied mathematics program and basic software research.	\$+ 1,644,000
Reduce support for HPCRP. The ORNL HPCRP will be supported for only six months in FY 1999.	- 7,727,000
Decrease in National Collaboratory research.	- 1,436,000
Initiation of Next Generation Internet funding.	+22,000,000
Decrease in ESnet operations.	- 787,000
Beginning in FY 1999, this program will budget \$40,000 for the estimated costs of obtaining and maintaining security clearances for contractor employees under the Chicago Operations Office and the Oak Ridge National Laboratory.	+ 40,000
Increase in SBIR/STTR funding due to increase in operating expenses.	<u>+ 367,000</u>
Total Funding Change, Mathematical, Information, and Computational Sciences	<u>\$+14,101,000</u>

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
LABORATORY TECHNOLOGY RESEARCH
(Tabular dollars in thousands, narrative in whole dollars)**

I. Mission Supporting Goals and Objectives: The mission of the Laboratory Technology Research (LTR) subprogram is to support high risk, energy related research that advances science and technology toward innovative applications that could significantly impact the Nation’s energy economy. Laboratory Technology Research is a scientific research program that fosters the production of research results motivated by a practical energy payoff, through formal cost-shared collaborations between the Energy Research (ER) multiprogram laboratories and industry.

An important component of the Department’s strategic goals is to ensure that the United States maintains its leadership in science and technology. LTR is the lead program in the Office of Energy Research for leveraging science and technology to advance understanding and to promote our country’s economic competitiveness through cost-shared partnerships with the private sector.

The multiprogram National Laboratories under the stewardship of the Office of Energy Research conduct breakthrough research in a variety of scientific and technical fields and operate unique scientific facilities for visiting scientists. Viewed as a system, these five laboratories, Argonne National Laboratory, Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest National Laboratory, offer a comprehensive resource for research collaborations. The major component of the LTR research portfolio consists of investments at these laboratories to conduct research that benefits all major stakeholders - the DOE, the industrial collaborators, and the Nation. These investments are further leveraged by the participation of an industry partner, using Cooperative Research and Development Agreements (CRADAs). Another important component of the LTR program provides rapid access by small business to the research capabilities at the ER multi-program laboratories, using several flexible mechanisms including personnel exchanges and technical consultations with small businesses.

II. Funding Schedule:

<u>Program Activity</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>\$ Change</u>	<u>% Change</u>
Laboratory Technology Research	\$ 17,307	\$ 12,005	\$ 15,897	\$+3,892	+ 32.4%
SBIR/STTR	0	419	432	+ 13	+ 3.1%
Congressional Direction	<u>6,359</u>	<u>3,370</u>	<u>0</u>	<u>-3,370</u>	<u>-100.0%</u>
Total	<u>\$ 23,666</u>	<u>\$ 15,794</u>	<u>\$ 16,329</u>	<u>\$+ 535</u>	<u>+ 3.4%</u>

COMPUTATIONAL AND TECHNOLOGY RESEARCH

LABORATORY TECHNOLOGY RESEARCH

III. Performance Summary - Accomplishments:	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
<p>- Maintain support for technology research in areas that advance science and technology towards innovative energy applications through cost-shared partnerships between Office of Energy Research multiprogram laboratories and industry. The program focuses on key initiatives and other high-leverage areas including advanced materials, intelligent processing, and sustainable environments. Provide technical assistance for small businesses through rapid access to the research and development at the multiprogram laboratories.</p>	\$ 17,307	\$ 12,005	\$ 15,897
<p><u>SBIR/STTR Funding</u> In FY 1997, \$608,000 and \$36,000 were transferred to the SBIR and STTR programs, respectively. The FY 1998 and FY 1999 amounts are the estimated requirement for the continuation of these programs.</p>	0	419	432
<p><u>Congressional Direction</u> Funds the University of Southwestern Louisiana (per FY 1997 Congressional Direction).</p>	6,359	3,370	0
<p>Total Laboratory Technology Research</p>	<u>\$ 23,666</u>	<u>\$ 15,794</u>	<u>\$ 16,329</u>

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
LABORATORY TECHNOLOGY RESEARCH**

EXPLANATION OF FUNDING CHANGES FROM FY 1998 to FY 1999:

Increase support of Technology Research projects, including rapid access projects to enable innovative collaborative research between Energy Research multiprogram laboratories and private industry in areas directed toward the goal of reducing greenhouse gases through efficient energy processes.	\$+3,887,000
Decrease support for the University of Southwestern Louisiana project for 3,370,000 which funding was completed in FY 1998.	-
Beginning in FY 1999, this program will budget \$5,000 for the estimated costs of obtaining and maintaining security clearances for contractor employees under the Chicago Operations Office and the Oak Ridge National Laboratory.	+ 5,000
Increase in SBIR/STTR funding due to increase in operating expenses.	+ 13,000
Total Funding Change, Laboratory Technology Research	<hr/> \$+ 535,000

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
ADVANCED ENERGY PROJECTS
(Tabular dollars in thousands, narrative in whole dollars)**

I. Mission Supporting Goals and Objectives: The Advanced Energy Projects (AEP) subprogram funds research to establish the feasibility of novel, energy-related concepts that span the Department's energy mission and goals. Funded projects are based on innovative ideas that span multiple scientific and technical disciplines and do not fit into any other DOE program area. A common theme for each project is the initial linkage of new research results to an energy application with a potentially significant payoff. Typically, AEP supports projects up to a level of about \$250,000 per year for a period of about 3 years. Projects are selected from proposals submitted by universities and national laboratories. Funding criteria emphasize scientific merit as judged by external peer review.

II. Funding Schedule:

<u>Program Activity</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>\$ Change</u>	<u>% Change</u>
Advanced Energy Projects	\$ 11,398	\$ 7,373	\$ 2,920	\$ -4,453	-60.4%
SBIR/STTR	<u>0</u>	<u>199</u>	<u>80</u>	<u>- 119</u>	<u>-59.8%</u>
Total	<u>\$ 11,398</u>	<u>\$ 7,572</u>	<u>\$ 3,000</u>	<u>\$ -4,572</u>	<u>-60.4%</u>

III. Performance Summary - Accomplishments:

<p>- Support for high-risk research at universities and national laboratories to establish the feasibility of novel energy related concepts that are at an early stage of scientific definition.</p>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	
	\$11,398	\$ 7,373	\$ 2,920	\$

<u>SBIR/STTR Funding</u>	0	199	80	
In FY 1997, \$285,000 and \$17,000 were transferred to the SBIR and STTR programs, respectively. The FY 1998 and FY 1999 amounts are the estimated requirement for the continuation of these programs.				
Total Advanced Energy Projects	<u>\$ 11,398</u>	<u>\$ 7,572</u>	<u>\$ 3,000</u>	

**COMPUTATIONAL AND TECHNOLOGY RESEARCH
ADVANCED ENERGY PROJECTS**

EXPLANATION OF FUNDING CHANGES FROM FY 1998 to FY 1999:

Significant decrease in level of research supported. Cancel several existing
\$-4,454,000
projects. No new novel, energy related concepts will be initiated.

Beginning in FY 1999, this program will budget \$1,000 for the estimated costs of
obtaining and maintaining security clearances for contractor employees under the
Chicago Operations Office and the Oak Ridge National Laboratory. + 1,000

Decrease in SBIR/STTR funding due to decrease in operating expenses. - 119,000

Total Funding Change, Advanced Energy Projects \$ -4,572,000

COMPUTATIONAL AND TECHNOLOGY RESEARCH
 CAPITAL OPERATING EXPENSES AND CONSTRUCTION SUMMARY
 (Dollars in thousands)

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>\$ Change</u>	<u>% Change</u>
Capital Operating Expenses					
Capital Equipment (total).....	\$6,403	\$6,356	\$6,275	\$-81	-1.3%
	<u>TEC</u>	<u>Previous Appropriated</u>	<u>FY 1997 Appropriated</u>	<u>FY 1998 Request</u>	<u>FY 1999 Request</u>
Major Items of Equipment (CE \$2 million and Above)					
1. Archival Systems Upgrade - LBNL	\$2,000	\$0	\$2,000	\$0	\$0

Acceptance
Date

4/97

**DEPARTMENT OF ENERGY
FY 1999 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
SCIENCE**

(Tabular dollars in thousands, Narrative in whole dollars)

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

PROGRAM MISSION

The Multiprogram Energy Laboratories - Facilities Support (MEL-FS) program provides line item construction funding to support the general purpose infrastructure of the Energy Research's five multiprogram national laboratories. These are: Argonne National Laboratory - East (ANL-E), Brookhaven National Laboratory (BNL), Lawrence Berkeley National Laboratory (LBNL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest National Laboratory (PNNL). These laboratories have over 1,100 buildings with 14.3 million gross square feet of space and an estimated replacement value of over \$9,000,000,000. All facilities at these laboratories are government-owned, contractor-operated (GOCO). Total operating funding for these laboratories is over \$3,000,000,000 a year. The Office of Energy Research manages this program to provide a comprehensive, prioritized and equitable approach to its stewardship responsibility for the general purpose support infrastructure of these laboratories. The program also provides funding for Payments in Lieu of Taxes (PILT) as authorized by the Atomic Energy Act of 1954, as amended. These discretionary payments are made to state or local governments where the Department or its predecessor agencies has acquired property previously subject to state or local taxation.

The GOAL of the MEL-FS program is:

To ensure that the support facilities at the multiprogram laboratories can meet the Department's research needs in a safe, environmentally sound, and cost-effective manner primarily by refurbishing or replacing deteriorated, outmoded, unsafe, and inefficient general purpose infrastructure.

The OBJECTIVES related to these goals are:

1. To correct Environment, Safety and Health (ES&H) inadequacies.
2. To reduce risk of operational interruptions due to failed support systems.
3. To provide cost effective operations and reduce maintenance costs.
4. To provide quality space for multiprogram research and support activities.

PROGRAM MISSION - MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT (Cont'd)