

DEPARTMENT OF ENERGY
FY 1990 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH

OVERVIEW

UNIVERSITY RESEARCH SUPPORT

Since the establishment of the Department of Energy in 1977, DOE has strongly supported close interactions with the Nation's universities. This objective was reemphasized in 1984 with the issuance of policy guidelines from the Secretary. The Secretarial guidelines note the importance to DOE of stable and comprehensive university research, technology transfer, and manpower development programs, both directly and through the Department's laboratories. Special emphasis was given to involving students in DOE sponsored research.

The University Research Support (URS) program and the related University Research Instrumentation (URI) program are the primary approaches used by DOE to strengthen the institutional capabilities of universities and colleges and the private sector to effectively contribute to the Department's long-range R&D mission. The URS program also includes the Department's R&D Laboratory Technology Transfer program. The URS program consists of four major subprograms and a set of interrelated program activities focused on the following primary objectives:

1. Strengthen university capability to perform long-range energy R&D;
2. Utilize the unique resources of the Department's laboratories (scientists, facilities, equipment) to assist in the national effort to revitalize the nation's economic competitiveness;
3. Enhance the quality and increase the numbers of young people interested in pursuing energy-related scientific and technical professional careers;
4. Take full advantage of the unique resources and facilities at the DOE national laboratories for both university faculty and student research and training, and precollege science education improvement.

The first URS subprogram, Laboratory Cooperative Science Centers, includes support for faculty and student research and training appointments at the DOE laboratories. The essential roles played by the Department's laboratories in assisting in university research and manpower development were strongly endorsed in the Energy Research Advisory Board (ERAB) and White House Science Council reports on the health of U.S. colleges, universities and industry. The recent ERAB report to the Secretary on the Department's role in science education (August 1988) states that "perhaps the Department's greatest contribution to education is in providing a link between universities and the laboratories." Consistent with these analyses and the President's goal of improving our national science and technology research and education base, the URS program continues to provide expanded support for lab-based education activities. This includes support for the expanded university and

precollege program at six DOE multiprogram laboratory science centers involved in enhancing science education. This effort is built upon the University Laboratory Cooperative Program (established in 1960) and provides significant additional opportunities for university faculty and students to use DOE laboratory facilities on a year-round basis. A major initiative begun in FY 1988 provides support for semester-length appointments for undergraduate science and engineering students selected nationally based on academic merit and future research interests. The emphasis on undergraduate student support is directly responsive to both the ERAB report on science education and a recent White House Science Council Report which recommends that Federal agencies provide additional research and training opportunities for the best and brightest undergraduate science and engineering students.

The second URS subprogram, R&D Laboratory Technology Transfer, provides support to industry scientists and engineers to work on assignment at a national laboratory side-by-side with DOE's scientists to transfer federally supported expertise to the private sector for commercial applications. These assignments are cost-shared with industry and involve both large and small companies. Support is also provided for pilot laboratory initiatives to improve the process for transferring federally funded R&D to U.S. industry and for better and more widespread communication of the technology transfer opportunities that are available at the laboratories.

The third URS subprogram, University Reactor Fuel Assistance, provides support for refueling and related activities for university nuclear research and training reactors. Continued support will be provided to the low enriched uranium (LEU) reactor fuel conversion program, as required by the Nuclear Regulatory Commission. Eleven university reactors will have either converted, or will be in the process of converting, to LEU by FY 1990.

The fourth URS subprogram, Energy Manpower Development, includes efforts directed at increasing the number of young people pursuing energy-related scientific and technical careers. This subprogram also includes the Department's statutory responsibility for assessing the supply and demand of manpower for both current and future energy R&D programs. Approximately 23 Pre-Freshman Engineering projects, reaching 2,200 students will be supported in FY 1990. Seven high school science student honors programs will be supported in FY 1990. Students are selected for participation in these programs by the Governors of the respective states. Similar DOE programs sponsored since FY 1985 have received national visibility and acclaim as ways of exposing the very best high school science students to the world-class research facilities and programs at the DOE laboratories. Eight DOE laboratories will also sponsor summer research programs for approximately 150 high school science teachers selected on a national basis.

DEPARTMENT OF ENERGY
 FY 1990 CONGRESSIONAL BUDGET REQUEST
 ENERGY SUPPLY RESEARCH AND DEVELOPMENT
 (dollars in thousands)

LEAD TABLE

University Research Support

Activity -----	FY 1988 Actual -----	FY 1989 Estimate -----	FY 1990 Base -----	FY 1990 Request -----	Program Change Request vs Base -----	
					Dollar -----	Percent -----
Laboratory Cooperative Science Centers.....	\$13,571	\$15,443	\$15,443	\$9,370	\$ -6,073	- 39%
R&D Laboratory Technology Transfer.....	1,054	1,400	1,400	1,675	+ 275	+ 20%
University Reactor Fuel Assistance.....	1,746	2,175	2,175	2,265	+ 90	+ 4%
Energy Manpower Development.....	1,802	2,695	2,695	2,761	+ 66	+ 2%
Total Program (OE).....	<u>\$18,173 a/</u>	<u>\$21,713</u>	<u>\$21,713</u>	<u>\$16,071</u>	<u>\$ -5,642</u>	<u>- 26%</u>

Authorization: Section 209, P.L. 95-91.

a/ Total reduced by \$227,000 which has been transferred to SBIR.

DEPARTMENT OF ENERGY
FY 1990 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

University Research Support

FY 1989 Appropriation.....	\$21,713
- Discontinue nuclear engineering research and education program.....	-6,000
- Increase support for laboratory technology transfer activities, including visiting industrial scientists appointments.....	+ 275
- Decrease support to laboratory cooperative science centers.....	- 73
- Increase support for reactor sharing grants.....	+ 90
- Maintain support for lab pre-college science student programs and for national high school science teacher research program	<u>+ 66</u>
FY 1990 Congressional Budget Request.....	\$16,071

DEPARTMENT OF ENERGY
 FY 1990 CONGRESSIONAL BUDGET REQUEST
 OFFICE OF ENERGY RESEARCH
 (dollars in thousands)

KEY ACTIVITY SUMMARY
 UNIVERSITY RESEARCH SUPPORT

I. Preface: Laboratory Cooperative Science Centers

Support is provided for university faculty, graduate, and undergraduate students to participate in summer and semester-length research and education activities at DOE laboratories. One of the principal goals of this program is to take full advantage of the unique resources and facilities at the DOE laboratories for faculty and student research and related education. Support is also provided for a year-round science semester program, faculty/student team research and special precollege science programs, at six multiprogram DOE laboratories that have established comprehensive lab coop science centers.

II. A. Summary Table

Program Activity -----	FY 1988 Actual -----	FY 1989 Estimate -----	FY 1990 Request -----	% Change -----
Laboratory Cooperative Science Centers.....	\$ 13,571	\$15,443	\$ 9,370	- 39
Total Laboratory Cooperative Science Centers.....	\$ 13,571	\$15,443	\$ 9,370	- 39

II. B. Major Laboratory and Facility Funding

Ames Laboratory.....	\$ 120	\$ 95	\$ 100	+ 5
Argonne National Laboratory.....	2,550	2,666	2,670	--
Brookhaven National Laboratory..	725	855	900	+ 5
Fermi National Laboratory.....	20	0	0	--
DuPont E.I. DeNemours.....	100	100	100	--
Idaho National Engineering Lab..	117	117	0	- 100
Lawrence Berkeley Laboratory....	625	600	700	+ 17
Oak Ridge National Laboratory...	300	450	1,100	+ 144
Pacific Northwest Laboratory....	43	73	400	+ 448
Los Alamos National Laboratory..	110	275	300	+ 9
Oak Ridge Assoc. Univ.....	2,648	2,015	1,250	- 38
Total.....	\$ 7,358	\$ 7,246	\$ 7,520	+ 4

III. Activity Descriptions

Program Activity

FY 1988

FY 1989

FY 1990

Laboratory Cooperative
Science Centers

Supports 2,300 faculty/student summer research and instructional appointments and initiates semester-length research and instructional programs for 300 nationally selected undergraduate science and engineering students at 5 DOE multiprogram lab science centers. (\$8,571)

Supports semester-length research appointments for 450 science/engineering undergraduate students at six laboratory science centers and 36 faculty/student research teams. Provides support for 2,000 summer faculty/student research appointments. (\$9,443)

Similar faculty/student participant levels as in FY 1989. (\$9,370)

As mandated by Congress in FY 1988, provide support for university-based nuclear engineering research and education programs including 20 competitive awards, 10 graduate research fellowships and an indepth assessment by the NAS/NRC of nuclear engineering research and education. (\$5,000)

Continue FY 1988 program. (\$6,000)

No Activity.

\$13,571

\$15,443

\$9,370

I. Preface: R&D Laboratory Technology Transfer

This Department-wide program aims at facilitating the effective spin-off of Federally supported technology from the laboratories, making the results of research and development available widely and promptly in the marketplace. Assignment of industry scientists at multiprogram and major single program laboratories and support of pilot technology transfer initiatives are integral components of this program. Consistent with the President's Executive Order on Facilitating Access to Science and Technology, the U.S., private and public sectors can broaden their technology base with new knowledge and opportunities from Federal laboratories.

II. A. Summary Table

Program Activity	FY 1988 Actual	FY 1989 Estimate	FY 1990 Request	% Change
R&D Laboratory Technology Transfer.....	\$ 1,054	\$ 1,400	\$ 1,675	+ 20
Total R&D Laboratory Technology Transfer.....	\$ 1,054	\$ 1,400	\$ 1,675	+ 20

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory....	\$ 246	\$ 115	\$ 125	+ 9
Ames Laboratory.....	0	0	75	--
Brookhaven National Laboratory..	50	100	125	+ 25
Fermi National Laboratory.....	90	30	75	+ 150
Idaho National Engineering Lab.	80	100	125	+ 25
Lawrence Berkeley Laboratory...	73	116	125	+ 8
Lawrence Livermore Nat. Lab. ..	0	100	125	+ 25
Los Alamos National Laboratory..	38	100	125	+ 25
Oak Ridge National Laboratory...	30	100	125	+ 25
Pacific Northwest Laboratory...	284	125	125	--
Sandia National Laboratory.....	115	125	125	--
Solar Energy Research Institute	0	0	75	--
Total.....	\$ 1,006	\$ 1,011	\$ 1,350	+ 34

III. Activity Descriptions

Program Activity	FY 1988	FY 1989	FY 1990
R&D Laboratory Technology Transfer	<p>Increase number of industry-laboratory technology exchange assignments to 25 and include major single program laboratories in the program.</p>	<p>Increase number of industry-laboratory technology exchange assignments to 30, adding some targeted assignments in high temperature superconductivity pilot centers.</p>	<p>Fund 30 industry-laboratory technology exchange assignments at multiprogram and major single program laboratories.</p>
	<p>Publish Technology '87 to report the Department's technology transfer opportunities and accomplishments. Undertake additional laboratory technology initiatives with the prospect of broad application (\$1,054).</p>	<p>Pursue highly leveraged laboratory technology transfer initiatives including some in support of the high temperature superconductivity pilot centers with strong cost-sharing component. (\$1,400).</p>	<p>Fund additional highly leveraged laboratory technology transfer initiatives that have the prospect of broad applications in response to increased needs as laboratory technology transfer programs expand.</p>
	\$ 1,054	\$ 1,400	\$ 1,675

I. Preface: University Reactor Fuel Assistance

Provides support associated with the fabrication and shipping of nuclear fuel for university-based nuclear research/training reactors. The university-based nuclear research and manpower development effort is highly dependent on these specialized facilities, not only for nuclear related training, but also for research in the basic sciences. Support is provided through this program for the NRC-mandated conversion of university reactors to low enriched uranium fuel. This subprogram also includes support on a competitive basis for university reactor sharing grants which provide research and training opportunities for faculty/students from nearby universities and colleges without direct access to research reactors.

II. A. Summary Table

Program Activity	FY 1988	FY 1989	FY 1990	% Change
-----	-----	-----	-----	-----
University Reactor				
Fuel Assistance.....	\$ 1,746	\$ 2,175	\$ 2,265	+ 4
	-----	-----	-----	-----
Total University Reactor				
Fuel Assistance.....	\$ 1,746	\$ 2,175	\$ 2,265	+ 4

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory....	\$ 200	\$ 200	\$ 50	- 75
Brookhaven National Laboratory.	0	15	15	--
DuPont E.I. DeNemours.....	35	35	25	- 29
Idaho National Engineering Lab.	710	1,475	1,600	+ 9
	-----	-----	-----	-----
Total.....	\$ 945	\$ 1,725	\$ 1,690	- 2

III. Activity Descriptions

Program Activity	FY 1988	FY 1989	FY 1990
University Reactor Fuel Assistance	Support for refueling of 3 reactors (2 with LEU fuel) and support 23 reactor sharing awards. Continue support of LEU conversion. Replace HEU fuel from 5 reactors (\$1,746).	Provide refueling for four reactors (2 with LEU fuel) and fund 20 reactor sharing awards involving scientists from more than 50 colleges and universities. Continues support for LEU conversion (\$2,175).	Refuels five reactors -- MIT, Univ of Michigan, (LEU) Univ of Missouri, Lowell Univ (LEU) and the Rhode Island Nuclear Center (LEU). Funds 20 reactor sharing awards and continues support for LEU conversion. (\$2,265)
	\$ 1,746	\$ 2,175	\$ 2,265

I. Preface: Energy Manpower Development

This program supports the continued collection and analysis of base line data on the employment, utilization, and supply of engineers and scientists relative to energy-related manpower supply/demand. This activity also supports the Department's longer term R&D mission by encouraging students, including women and minorities, to pursue energy-related scientific and technical careers through the support of such activities as the Pre-Freshman Engineering Program (PREP), laboratory-based high school science teacher research programs, and the DOE national high school science student honors program.

Program Activity	FY 1988 Actual	FY 1989 Estimate	FY 1990 Request	% Change
Energy Manpower Development.....	\$ 1,802	\$ 2,695	\$ 2,761	+ 2
Total Energy Manpower Development.....	\$ 1,802	\$ 2,695	\$ 2,761	+ 2

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory....	\$ 50	\$ 233	\$ 100	- 57
Brookhaven National Laboratory.	110	200	100	- 50
Fermi National Laboratory.....	160	185	100	- 46
Lawrence Berkeley Laboratory...	158	120	150	+ 25
Lawrence Livermore Nat. Lab....	154	208	135	- 35
Los Alamos National Laboratory.	0	85	0	- 100
Oak Ridge National Laboratory..	106	205	125	- 39
Pacific Northwest Laboratory...	51	50	110	+ 120
Total.....	\$ 789	\$ 1,286	\$ 820	- 36

III. Activity Descriptions

Program Activity	FY 1988	FY 1989	FY 1990
Energy Manpower Development	Support energy-related manpower supply/demand studies including analysis of census data on scientists/engineers involved in all phases of energy R&D. (\$503)	Continues analyses of manpower in energy-related fields including assessment of needs for advanced degree professionals (\$523).	Similar ongoing activities as in FY 1989. (\$550)
	Support 20 PREP projects reaching 2,100 students (\$320).	Support 20 PREP projects reaching 2,100 students (\$350).	Supports 23 PREP projects reaching 2,200 students. (\$350)

III. Energy Manpower Development (Cont'd)

Program Activity -----	FY 1988 -----	FY 1989 -----	FY 1990 -----
Continue support for laboratory-based precollege science programs including six high school student honors programs (LLNL, BNL, Fermi, LBL, ANL, & ORNL) (\$979).		Continues support for laboratory-based precollege science education programs including support for a seventh high school science student honors program at PNL. (\$1,057)	Continue support for high school student honors research programs at seven labs. This level would support approximately 375 students. (\$1,061)
No Activity.		Initiates support for national high school science teacher research program at seven DOE labs. The summer hands-on research/instructional programs would support 120 teachers. Teachers would be selected on a national basis through the Council of State Science Supervisors (\$765).	Continues support for high school science teacher research participation appointments at eight DOE laboratories. Program is being conducted in close coordination with NSF and the Dept. of Education (\$800).
	\$1,802	\$2,695	\$2,761
Total University Research Support	\$18,173	\$21,713	\$16,071