

# Congressional Budget Request

Energy Supply Research and Development  
Nuclear Waste Fund

Volume 2

**FY 1988**



U.S. Department of Energy  
Assistant Secretary,  
Management and Administration  
Office of the Controller

January 1987

DEPARTMENT OF ENERGY  
 FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST  
 SUMMARY OF ESTIMATES BY APPROPRIATIONS  
 BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	<u>FY 1986</u> <u>Actual</u> <u>BA</u>	<u>FY 1987</u> <u>Estimate</u> <u>BA</u>	<u>FY 1988</u> <u>Request</u> <u>BA</u>
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development .....	\$ 1,701,351	\$ 1,254,131	\$ 1,914,710
Uranium Enrichment .....	1,549,015	1,210,400	1,070,000
General Science and Research .....	659,059	719,517	814,498
Atomic Energy Defense Activities ..	7,292,405	7,481,852	8,050,000
Departmental Administration .....	235,676	139,509	166,133
Alaska Power Administration .....	3,245	2,881	3,026
Bonneville Power Administration ...	404,329	327,659	205,800
Southeastern Power Administration .	---	19,647	27,400
Southeastern - Continuing Fund ....	4,028	---	---
Southwestern Power Administration .	29,180	25,337	16,648
Western Area Power Administration .	195,842	240,309	295,515
Western Area Power Emergency Fund .	147	225	---
Federal Energy Regulatory Commission .....	45,107	-3,465	-900
Nuclear Waste Fund .....	499,037	499,000	500,000
Geothermal Resources Development Fund .....	<u>69</u>	<u>72</u>	<u>72</u>
Subtotal, Appropriations Before the Energy and Water Development Subcommittees .....	<u>\$12,618,490</u>	<u>\$11,917,074</u>	<u>\$13,062,902</u>

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	<u>FY 1986 Actual BA</u>	<u>FY 1987 Estimate BA</u>	<u>FY 1988 Request BA</u>
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production .....	\$ 2,775	\$ ---	\$ ---
Clean Coal Technology .....	---	---	50,000
Fossil Energy Research and Development .....	309,389	251,402	168,900
Naval Petroleum and Oil Shale Reserves .....	13,002	122,177	159,700
Energy Conservation .....	426,187	149,679	86,090
Energy Regulation .....	23,423	23,400	21,680
Emergency Preparedness .....	5,750	6,044	6,206
Strategic Petroleum Reserve .....	107,533	147,433	270,181
Energy Information Activities .....	<u>57,724</u>	<u>60,301</u>	<u>61,599</u>
Subtotal, Interior and Related Agencies Subcommittees .....	945,783	760,436	824,356
Subtotal, Energy and Water Development Subcommittees .....	<u>12,618,490</u>	<u>11,917,074</u>	<u>13,062,902</u>
Subtotal, Department of Energy .....	13,564,273	12,677,510	13,887,258
Permanent - Indefinite Appropriations:			
Payments to States .....	<u>629</u>	<u>705</u>	<u>727</u>
Total, Department of Energy .....	<u>\$13,564,902</u>	<u>\$12,678,215</u>	<u>\$13,887,985</u>

DEPARTMENT OF ENERGY  
 FY 1988 CONGRESSIONAL STAFFING REQUEST  
 TOTAL WORK FORCE

	FY1986 FTE USAGE	FY1987 -FY86	FY1987 CONGR REQ	FY1988 -FY87	FY1988 CONGR REQ
ENERGY & WATER SUBCOMMITTEE					
HEADQUARTERS	4,663	170	4,833	47	4,880
FIELD	9,393	62	9,455	-4	9,451
SUBCOMMITTEE TOTAL	14,056	232	14,288	43	14,331
INTERIOR SUBCOMMITTEE					
HEADQUARTERS	1,254	-13	1,241	-104	1,137
FIELD	883	5	888	-143	745
SUBCOMMITTEE TOTAL	2,137	-8	2,129	-247	1,882
GRAND TOTAL	16,193	224	16,417	-204	16,213
ADJUSTMENT		-317	-317	54	-263
ADJUSTED TOTAL	16,193	-93	16,100	-150	15,950

DEPARTMENT OF ENERGY  
 FY 1988 CONGRESSIONAL STAFFING REQUEST  
 TOTAL WORK FORCE

	FY1986 FTE USAGE	FY1987 -FY86	FY1987 CONGR REQ	FY1988 -FY87	FY1988 CONGR REQ
10 ENERGY SUPPLY RESEARCH AND DEV	918	0	926	0	926
HEADQUARTERS	635	4	639	0	639
FIELD	283	4	287	0	287
18 URBAN ENRICHMENT	65	2	67	0	67
HEADQUARTERS	54	2	56	0	56
FIELD	11	0	11	0	11
20 GENERAL SCIENCE AND RESEARCH	38	1	39	0	39
HEADQUARTERS	38	1	39	0	39
23 ATOMIC ENERGY DEFENSE ACTIVITY	2,718	142	2,860	30	2,890
HEADQUARTERS	491	52	543	19	562
FIELD	2,227	90	2,317	11	2,328
30 DEPARTMENTAL ADMINISTRATION	3,273	77	3,350	20	3,370
HEADQUARTERS	1,493	46	1,539	5	1,544
FIELD	1,500	31	1,611	15	1,626
34 ALASKA POWER ADMINISTRATION	36	2	38	-3	35
FIELD	36	2	38	-3	35
36 DONNEVILLE POWER ADMIN	3,491	-41	3,430	-50	3,380
FIELD	3,491	-41	3,430	-50	3,380
38 SOUTHEASTERN POWER ADMIN	38	2	40	0	40
FIELD	38	2	40	0	40
42 SOUTHWESTERN POWER ADMIN	193	-7	186	0	186
FIELD	193	-7	186	0	186
46 WAPA - POWER MARKETING	1,176	-14	1,160	0	1,160
FIELD	1,176	-14	1,160	0	1,160
50 WAPA - COLORADO RIVER BASIN	219	0	219	0	219
FIELD	219	0	219	0	219
52 FEDERAL ENERGY REGULATORY COMM	1,897	62	1,959	0	1,959
HEADQUARTERS	1,897	62	1,959	0	1,959
54 NUCLEAR WASTE FUND	291	20	311	44	357
HEADQUARTERS	154	3	157	23	180
FIELD	137	17	154	23	177
56 GEOTHERMAL RESOURCES DEV FUND	1	0	1	0	1
HEADQUARTERS	1	0	1	0	1
65 FOSSIL ENERGY RESEARCH AND DEV	706	-9	703	-113	590
HEADQUARTERS	141	-3	138	0	138
FIELD	565	0	565	-113	452
70 MINNAPL PETROL & OIL SHALE RES	99	-4	95	0	95
HEADQUARTERS	20	2	22	0	22
FIELD	79	-4	73	0	73
75 ENERGY CONSERVATION	322	30	352	-109	243
HEADQUARTERS	201	26	227	-84	143
FIELD	121	4	125	-25	100
80 EMERGENCY PREPAREDNESS	64	7	71	0	71
HEADQUARTERS	64	7	71	0	71
81 ECONOMIC REGULATION	348	-53	295	-20	275
HEADQUARTERS	348	-53	295	-20	275
85 STRATEGIC PETROLEUM RESERVE	152	-0	147	-5	142
HEADQUARTERS	34	-12	22	0	22
FIELD	118	7	125	-5	120
90 ENERGY INFORMATION ACTIVITIES	446	20	466	0	466
HEADQUARTERS	446	20	466	0	466
94 ADVANCES FOR CO-OP WORK	2	0	2	0	2
FIELD	2	0	2	0	2
<b>GRAND TOTAL</b>	<b>16,193</b>	<b>274</b>	<b>16,417</b>	<b>-204</b>	<b>16,213</b>
<b>ADJUSTMENT</b>		<b>-317</b>	<b>-317</b>	<b>54</b>	<b>-263</b>
<b>ADJUSTED TOTAL</b>	<b>16,193</b>	<b>-93</b>	<b>16,100</b>	<b>-150</b>	<b>15,950</b>

ENERGY SUPPLY, RESEARCH AND DEVELOPMENT  
ACTIVITIES

(Including Transfer of Funds)

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for energy supply, research and development activities, and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed [18] 21 for replacement only), [\$1,347,048,000,] \$1,909,710,000, to remain available until expended; [in addition \$684,158,000 shall be derived by transfer from Uranium Supply and Enrichment Activities provided in prior years and shall be available until expended; and of which \$84,100,000 which shall be available only for the Center for New Industrial Materials; the Center for New Industrial Materials; the Center for Nuclear Imaging Research; the Energy Research Complex; Saint Christopher's Hospital for Children - Energy Demonstration Project; Center for Excellence in Education - Energy Utilization Performance Project; the Institute of Nuclear Medicine; the Advanced Science Center; the Center for Science and Engineering; and funds provided for byproducts utilization activities shall be available only for the following regional projects: Florida Department of Agriculture and Consumer Services; Hawaii Department of Planning and Economic Development; Iowa State University; Oklahoma, Red-Ark Development Authority; Washington, Port of Pasco; State of Alaska.] (Energy and Water Development Appropriations Act, 1987 as included in Public Laws 99-500 and 99-591, section 101(e),) and in addition, as authorities by section 201 of Public Law 95-238 and notwithstanding 31 U.S.C. 3302, revenues received as user fees for use of the Liquefied Gaseous Fuels Spill Test Facility in Fiscal Year 1988 shall be retained and used to provide toxic and flammable spill test facilities and activities.

Explanation of Change

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Deletes Language contained in Public Laws 99-500 and 99-591 which had specific application to fiscal year 1987.

Proposed Language provides fees from non-Federal users of the Liquefied Gaseous Fuels Spill Test Facility in Nevada to be received into the account as reimbursable expenses to be retained and used to operate, manage and maintain the facility.

DEPARTMENT OF ENERGY  
 FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST  
 SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY  
 ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
 BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
Solar Energy .....	\$ 143,464	\$ 123,532	\$ 71,175
Cooperative Venture R&D Pools .....	---	---	5,000
Geothermal .....	26,495	20,830	15,935
Hydropower .....	481	450	---
Electric Energy Systems .....	11,387	11,276	6,500
Energy Storage Systems .....	17,142	16,589	7,500
Nuclear Energy R&D .....	372,037	327,474	334,170
Remedial Action & Waste Technology .	229,915	276,870	251,500
Civilian Waste R&D .....	15,991	6,500	5,000
Environmental, Safety and Health ...	44,004	62,014	70,000
Biological and Environmental Research .....	178,000	193,992	217,500
Liquified Gaseous Spill Test Facility .....	1,732	2,000	500
Magnetic Fusion .....	361,480	345,313	345,600
Basic Energy Sciences .....	419,850	525,450	479,075
Energy Research Analysis .....	2,567	2,000	3,700

DEPARTMENT OF ENERGY  
 FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST  
 SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY  
 ENERGY SUPPLY RESEARCH AND DEVELOPMENT (CONTINUED)

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	<u>FY 1986 Actual</u>	<u>FY 1987 Estimate</u>	<u>FY 1988 Request</u>
University Research Instrumentation.	6,176	5,000	5,000
University Research Support .....	10,168	15,775	13,400
Advisory and Oversight Program Direction .....	2,674	2,490	3,200
Multi-Program Laboratories Facilities Support .....	39,908	56,695	56,600
Small Business Innovation Research Program .....	29,137	---	---
In-House Energy Management .....	11,715	16,500	18,800
Strategic Facilities Utilization Program .....	---	---	2,175
Technical Information and Management .....	12,407	14,698	14,000
Policy and Management .....	<u>3,497</u>	<u>3,874</u>	<u>4,300</u>
Subtotal, Energy Supply R&D ...	1,940,227	2,029,322	1,930,710
Less Use of Prior Year Balances and Other Adjustment .....	<u>-238,876</u>	<u>-775,191</u>	<u>-16,000</u>
Total, Energy Supply R&D.....	<u>\$1,701,351</u>	<u>\$1,254,131</u>	<u>\$1,914,710</u>



DEPARTMENT OF ENERGY  
FY 1988 CONGRESSIONAL BUDGET REQUEST  
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

University Research Instrumentation

University scientists have been hampered in recent years in their ability to conduct state-of-the-art scientific research by increasingly obsolete or inadequate scientific research instrumentation. Advanced research requires advanced scientific instrumentation. The "state-of-the-art" of scientific research instrumentation has progressed so rapidly in the last five years (along with the purchase price of new instruments) that major research instruments are obsolete in three to five years. Such instruments are no longer used solely by one scientist but rather are shared by many scientists often from different disciplines and academic departments. For example, a 500 MZ Nuclear Magnetic Resonance Spectrometer at Purdue University serves 270 researchers, including DOE sponsored researchers, in an around-the-clock operation. The lack of access to advanced scientific instrumentation also has affected the preparation and training received by graduate students. Since the vast majority of university graduates are employed by industry, this in turn requires industrial scientists to spend an inordinate amount of time in training new staff in the use of advanced research instrumentation, thereby affecting industrial research productivity.

During the past decade there have been a variety of Federal and private studies on the instrumentation problem in universities. In a 1984 study by the National Science Foundation (NSF) it was estimated that the need for new instrumentation for universities ranges from one to four billion dollars, an amount far in excess of that which can be financed by the universities themselves. In 1984 Federal support for university instrumentation totaled \$608 million. The importance of the university research instrumentation problem has been recognized by the Office of Science and Technology Policy (OSTP). As a result OSTP established a coordinated program involving all the major agencies which provide research support to universities, aimed at improving the quality of research instrumentation in universities. In addition to DOE, the principal agencies involved in this program are NSF, DOD and NIH, with each agency responsible for providing the instruments required related to their mission requirements. This effort is coordinated by an interagency committee on university research instrumentation chaired by the NSF Deputy Director.

The primary objective of the DOE University Research Instrumentation program (URI) is to strengthen the capabilities of university scientists to conduct advanced research on energy problems and processes. A secondary

objective is to provide graduate students with first-hand experience in the use of sophisticated research instrumentation. The URI program is complementary to the Department's energy research and technology programs. In general, DOE university research grants and contracts provide support only for research operating costs (salaries, computer time, etc.) with funding for new instrumentation limited on average to those smaller instruments costing \$30,000 or less. In contrast, the URI program assists universities in purchasing instruments which cost in excess of \$100,000, which will be required by a number of faculty researchers, and which because of their size, cost and use by a single investigator could be justified on an individual research award.

The program is a competitive one, involving substantial cost-sharing from the institution, with awards based on the merit and accomplishments of current DOE-supported research projects and the degree to which the new equipment will enable the researchers to substantially advance the understanding of energy-related phenomena. A total of 40 awards have been made in the past two years, ranging from \$98,000 to \$466,000, with the average award at \$223,000.

In past years the URI program has given special attention to the need for advanced scientific equipment for research on metallurgy, ceramics, solid state materials, catalysis, fluid mechanics, heat transfer, fermentation, plant growth, atmospheric pollutants, combustion and nuclear waste storage. The research areas were selected after discussions with the DOE research program directors. In FY 1986 the program encouraged the submission of proposals involving "innovative" instrumentation (equipment generally not available at U.S. universities). Special emphasis will again be placed on "innovative" instrumentation needs for advanced topics in energy research in FY 1987 and in FY 1988. A recent survey estimated that the overall short term need for advanced scientific instrumentation for university energy research was approximately \$150 million. Of this amount, about \$15 to \$20 million was specified for "innovative" equipment.

DEPARTMENT OF ENERGY  
 FY 1988 CONGRESSIONAL BUDGET REQUEST  
 ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
 (dollars in thousands)

LEAD TABLE

University Research Instrumentation

Activity -----	FY 1986 Actual -----	FY 1987 Appropriation -----	FY 1988 Base -----	FY 1988 Request -----	% Change from FY 1987 Approp. -----
University Research Instrumentation.....	\$ 6,176	\$ 5,000	\$ 5,000	\$ 5,000	---
Total.....	6,176 a/ b/	5,000	5,000	5,000	---
Operating Expenses.....	(6,176)	(5,000)	(5,000)	(5,000)	---
Total Program.....	(\$ 6,176)	(\$ 5,000)	(\$ 5,000)	(\$ 5,000)	---

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

a/ Total has been reduced by \$78,000 which has been transferred to SBIR program.

b/ Total has been reduced by \$246,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

DEPARTMENT OF ENERGY  
FY 1988 CONGRESSIONAL BUDGET REQUEST  
ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
(dollars in thousands)

SUMMARY OF CHANGES

University Research Instrumentation

FY 1987 Appropriation Enacted.....	\$ 5,000
Program increase and decreases:	
- Instrumentation awards remain the same as FY 1987.....	<u>0</u>
FY 1988 Congressional Budget Request.....	\$ 5,000

DEPARTMENT OF ENERGY  
 FY 1988 CONGRESSIONAL BUDGET REQUEST  
 ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
 (dollars in thousands)

UNIVERSITY RESEARCH INSTRUMENTATION

I. Preface:

The program will concentrate on providing instrumentation support for university research groups which have already demonstrated expertise in one of a small number of specified high priority energy-related topics which are of special concern to the Department's research programs.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
University Research Instrumentation	\$6,176	\$5,000	\$5,000	0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
University Research Instrumentation	<p>In FY 1986, 30 awards were granted to 26 universities. (\$6,176)</p> <p>Award topics are:</p> <ul style="list-style-type: none"> <li>o Advanced Materials Characterization, Synthesis, and Processing Science</li> <li>o Health and Environmental Effects of Energy Development and Use</li> <li>o Engineering Sciences</li> <li>o Catalysis (Heterogeneous and Homogeneous), Photochemistry and Photocatalysis</li> </ul>	<p>It is anticipated that 15 to 18 competitively selected awards will be granted. (\$5,000)</p> <p>Planned topics are:</p> <ul style="list-style-type: none"> <li>o Metallurgy and Ceramics</li> <li>o Combustion and Thermodynamics Processes</li> <li>o Health and Environmental Effects</li> <li>o Geochemical and Geophysical Research</li> <li>o Biological Energy Conversion</li> <li>o Thermochemical and Thermophysical Phenomena</li> </ul>	<p>It is anticipated that 15 to 18 competitively selected awards will be granted. (\$5,000)</p> <p>Planned areas for selected topics are:</p> <ul style="list-style-type: none"> <li>o Materials Science</li> <li>o Chemical Science</li> <li>o Health and Environmental Science</li> <li>o Biological Science</li> <li>o Nuclear Science</li> <li>o Geochemistry</li> </ul>
Total University Research Instrumentation	\$ 6,176	\$ 5,000	\$ 5,000