

# Congressional Budget Request

Energy Supply Research and Development

Volume 3

FY 1987



U.S. Department of Energy

Assistant Secretary,  
Management and Administration  
Office of the Controller  
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DEPARTMENT OF ENERGY  
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST  
ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
VOLUME 3  
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DEPARTMENT OF ENERGY  
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	<u>FY 1985 Actual BA</u>	<u>FY 1986 Estimate BA</u>	<u>FY 1987 Request BA</u>
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development .....	1,967,490	1,696,298	1,254,162
Uranium Enrichment .....	237,956	190,512	---
General Science and Research .....	724,860	655,928	773,400
Atomic Energy Defense Activities ..	7,322,321	7,231,664	8,230,000
Departmental Administration .....	128,602	150,319	151,082
Alaska Power Administration .....	3,233	3,245	2,881
Bonneville Power Administration ...	284,771	330,000	276,100
Southeastern Power Administration .	35,744	---	19,647
Southwestern Power Administration .	31,208	29,191	25,337
Western Area Power Administration .	218,230	195,910	240,309
Western Area Power Emergency Fund .	---	---	---
Federal Energy Regulatory Commission .....	54,543	41,989	20,325
Nuclear Waste Fund .....	327,669	499,037	769,349
Geothermal Resources Development Fund .....	<u>121</u>	<u>69</u>	<u>72</u>
Subtotal, Appropriations Before the Energy and Water Development Subcommittees .....	<u>\$11,336,748</u>	<u>\$11,024,162</u>	<u>\$11,762,664</u>

DEPARTMENT OF ENERGY  
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	<u>FY 1985</u> <u>Actual</u> <u>BA</u>	<u>FY 1986</u> <u>Estimate</u> <u>BA</u>	<u>FY 1987</u> <u>Request</u> <u>BA</u>
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production .....	\$ 1,169,895	\$ ---	\$ ---
Clean Coal Technology .....	---	---	---
Fossil Energy Research and Development .....	289,048	311,954	82,767
Naval Petroleum and Oil Shale Reserves .....	156,874	13,002	127,108
Energy Conservation .....	457,436	427,512	39,433
Energy Regulation .....	27,139	23,423	21,850
Emergency Preparedness .....	6,045	5,750	6,044
Strategic Petroleum Reserve .....	2,049,550	107,533	---
Energy Information Activities .....	<u>60,919</u>	<u>57,724</u>	<u>59,651</u>
Subtotal, Interior and Related Agencies Subcommittees .....	4,216,906	946,898	336,853
Subtotal, Energy and Water Development Subcommittees .....	<u>11,336,748</u>	<u>11,024,162</u>	<u>11,762,664</u>
Subtotal, Department of Energy .....	15,553,654	11,971,060	12,099,517
Permanent - Indefinite Appropriations:			
Payments to States .....	<u>1,052</u>	<u>570</u>	<u>570</u>
Total, Department of Energy .....	<u>\$15,554,706</u>	<u>\$11,971,630</u>	<u>\$12,100,087</u>

DEPARTMENT OF ENERGY  
 FY 1987 CONGRESSIONAL STAFFING REQUEST  
 TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
ENERGY & WATER SUBCOMMITTEE				
HEADQUARTERS	4,865	4,965	-10	4,947
FIELD	9,133	9,185	111	9,296
SUBCOMMITTEE TOTAL	13,998	14,150	93	14,243
INTERIOR SUBCOMMITTEE				
HEADQUARTERS	1,353	1,304	-166	1,138
FIELD	907	896	-226	670
SUBCOMMITTEE TOTAL	2,260	2,200	-392	1,808
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY  
 FY 1987 CONGRESSIONAL STAFFING REQUEST  
 TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
10: ENERGY SUPPLY RESEARCH AND DEV	937	934	-34	900
HEADQUARTERS	811	820	-28	792
FIELD	126	114	-4	108
15: URANIUM ENRICHMENT	69	66	1	67
HEADQUARTERS	58	55	1	56
FIELD	11	11	0	11
20: GENERAL SCIENCE AND RESEARCH	37	39	0	39
HEADQUARTERS	37	39	0	39
25: ATOMIC ENERGY DEFENSE ACTIVITI	2,618	2,702	131	2,833
HEADQUARTERS	456	918	9	927
FIELD	2,122	2,184	122	2,306
30: DEPARTMENTAL ADMINISTRATION	3,307	3,352	-9	3,327
HEADQUARTERS	1,721	1,726	0	1,726
FIELD	1,586	1,604	-5	1,601
34: ALASKA POWER ADMINISTRATION	37	38	0	38
FIELD	37	38	0	38
36: BONNEVILLE POWER ADMIN	3,910	3,480	0	3,480
FIELD	3,510	3,480	0	3,480
38: SOUTHEASTERN POWER ADMIN	38	40	0	40
FIELD	38	40	0	40
42: SOUTHWESTERN POWER ADMIN	186	186	0	186
FIELD	186	186	0	186
46: WESTERN AREA POWER ADMIN	1,181	1,160	0	1,160
FIELD	1,181	1,160	0	1,160
50: WAPA - COLDRADO RIVER BASIN	219	219	0	219
FIELD	219	219	0	219
52: FEDERAL ENERGY REGULATORY COMM	1,617	1,659	0	1,659
HEADQUARTERS	1,617	1,659	0	1,659
54: NUCLEAR WASTE FUND	238	292	0	292
HEADQUARTERS	123	147	0	147
FIELD	115	145	0	145
56: GEOTHERMAL RESOURCES DEV FUND	2	1	0	1
HEADQUARTERS	2	1	0	1
65: POSSIL ENERGY RESEARCH AND DEV	714	700	-161	539
HEADQUARTERS	151	135	-26	100
FIELD	563	565	-135	430
70: NAVAL PETROL & OIL SHALE RES	104	104	-9	95
HEADQUARTERS	23	23	0	23
FIELD	81	81	-9	72
75: ENERGY CONSERVATION	333	352	-134	218
HEADQUARTERS	208	227	-79	148
FIELD	125	129	-55	70
80: EMERGENCY PREPAREDNESS	74	71	0	71
HEADQUARTERS	74	71	0	71
81: ECONOMIC REGULATION	377	340	-50	290
HEADQUARTERS	377	340	-50	290
85: STRATEGIC PETROLEUM RESERVE	178	152	-32	120
HEADQUARTERS	40	27	-5	22
FIELD	138	125	-27	98
90: ENERGY INFORMATION ACTIVITIES	480	481	-6	475
HEADQUARTERS	480	481	-6	475
94: ADVANCES FOR CO-OP WORK	2	2	0	2
FIELD	2	2	0	2
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY  
Proposed Appropriation Language  
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 [17] 18 for replacement only), [\$1,989,671,000] \$1,254,162, to remain available until expended [of which \$200,000,000]; in addition, \$584,158,000 shall be derived by transfer from Uranium Supply and Enrichment Activities provided in prior years[, and of which \$17,400,000 shall be derived by transfer from Operation and Maintenance, Southeastern Power Administration; and of which \$25,000,000 shall be available only for construction of]: Provided, That funds available under this head in Public Law 99-141 for the Advanced Science Center, the Center for Science and Technology, the Center for Energy and Biomedical Technology, the Energy and Mineral Research Center, and the Demonstration Center for Information Technologies [as described in the report accompanying this Act; together with not to exceed \$6,000,000, to be derived from revenues from activities of the Technical Information Services, which shall be credited to this account and used for necessary expenses and shall remain available until expended], shall be available for other expenses of energy supply, research and development activities. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY  
 FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST  
 SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY  
 ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
 (Budget Authority in Thousands of Dollars)

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Solar Energy .....	\$ 171,587	\$ 144,624	\$ 72,292
Geothermal .....	29,698	26,681	17,930
Hydropower .....	447	481	---
Electric Energy Systems .....	19,717	11,548	7,619
Energy Storage Systems .....	18,642	17,292	8,000
Nuclear Energy R&D .....	432,612	374,684	330,900
Remedial Action & Waste Technology ..	170,365	230,047	294,100
Civilian Waste R&D .....	25,806	16,064	6,500
Environmental, Safety and Health ...	38,053	46,921	76,098
Biological and Environmental Research .....	187,746	179,950	196,565
Liquified Gaseous Spill Test Facility .....	4,289	1,732	1,200
Magnetic Fusion .....	429,553	365,469	333,000
Basic Energy Sciences .....	410,000	433,770	441,370
Energy Research Analysis .....	2,970	2,598	3,550
University Research Instrumentation ..	4,950	6,254	5,000
University Research Support .....	10,059	10,296	10,075
Advisory and Oversight Program Direction .....	2,900	2,674	2,900
Multi-Program Laboratories Facilities Support .....	33,200	39,824	60,190
Small Business Innovation Research Program .....	24,724	---	---
In-House Energy Management .....	14,821	11,709	16,500
Technical Information and Management .....	13,442	12,413	10,775
Policy and Management .....	3,380	3,497	3,887
Subtotal, Energy Supply R&D ...	2,029,690	1,939,528	1,899,951
Less Use of Prior Year Balances and Other Adjustments .....	-62,400	-243,230	-645,789
Total, Energy Supply R&D .....	<u>\$1,967,490</u>	<u>\$1,696,298</u>	<u>\$1,254,162</u>



# SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

DEPARTMENT OF ENERGY  
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST  
ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
VOLUME 3  
SUPPORTING RESEARCH AND TECHNICAL ANALYSIS  
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DEPARTMENT OF ENERGY  
 FY 1987 CONGRESSIONAL BUDGET REQUEST  
 LEAD TABLE  
 UNIVERSITY RESEARCH INSTRUMENTATION  
 ENERGY SUPPLY RESEARCH AND DEVELOPMENT  
 (Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
University Research Instrumentation (ER)					
Operating Expenses.....	\$4,950	\$6,254	\$6,254	\$5,000	\$-1,254
Total					
Operating Expenses.....	<u>4,950</u>	<u>6,254</u>	<u>\$6,254</u>	<u>5,000</u>	<u>-1,254</u>
University Research Instrumentation.....	\$4,950 <sup>a/</sup>	\$6,254 <sup>b/</sup>	\$6,254	\$5,000	\$-1,254

<sup>a/</sup> FY 1985 total does not include \$50,000 transferred to the SBIR program.  
<sup>b/</sup> Total reduced by \$246,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

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

DEPARTMENT OF ENERGY  
 1987 CONGRESSIONAL BUDGET REQUEST  
 SUMMARY OF CHANGES  
 UNIVERSITY RESEARCH INSTRUMENTATION  
 (In thousands of dollars)

1986 Appropriation enacted.....	\$ 6,500
1986 Gramm-Rudman reduction.....	- 246
1986 adjusted.....	<u>\$ 6,254</u>
Program increases and decreases:	
o Decreases the number of planned instrumentation awards by approximately 6 to 9.....	-1,254
1987 budget request.....	<u>\$ 5,000</u>

Department of Energy  
 FY 1987 Congressional Budget Request  
 Adjustments to FY 1986 Appropriations

	<u>FY 1986 Confer.</u>	<u>Gram- Rudman- Hollings</u>	<u>Subtotal</u>	<u>Comparability Adjustments</u>	<u>Adjusted Approp. Total</u>
<u>University Research Instrumentation (ER)</u>					
Operating Expenses .....	6,500	-246	6,254		6,254
Subtotal, University Research Instrumentation .....	<u>6,500</u>	<u>-246</u>	<u>6,254</u>		<u>6,254</u>
Total, University Research Instrumentation .....	6,500	-246	6,254		6,254

The University Research Instrumentation Program provides support to university research groups on a competitive basis for the purchase of major, state-of-the-art scientific research instrumentation which is essential for continued progress in advanced energy-related scientific and technical research. Continued progress by university researchers in both fundamental energy sciences as well as research directed at improving current and developing new energy technologies requires direct access to new research instrumentation. For example, in the field of materials science, significant effort is being placed on the microanalysis of the structure and chemistry of matter. It is now possible to compare and study the microchemistry and microcrystallography of small samples of metals and ceramic materials. This research requires the use of a new generation of analytical, high resolution high voltage electron microscopes. Research advances in this area are directly relevant to long range research needs in fusion, advanced coal conversion, and solar photovoltaics. In the field of biological energy research a major limitation is in understanding the key proteins which influence physiological and genetic factors related to plant productivity. It is particularly difficult to determine the amino acid sequences of polypeptides. However, advances in the analytical capacity of mass spectrometry now offer biological scientists a means to overcome this problem.

Many university scientists do not have direct access to sophisticated, state-of-the-art scientific research instrumentation. This not only hampers their research but also significantly affects the training and preparation of graduate students for future research careers in industry, the university community or government laboratories. This is a serious national problem being addressed through the combined efforts of Federal science agencies, state governments, private industry and by the university community itself. The Federal effort is coordinated by the Office of Science and Technology Policy through the Interagency Committee on University Research Instrumentation. Each participating Federal agency is responsible for supporting university research instrumentation in relation to agency missions and programmatic needs.

The Department's response to this overall national effort is the University Research Instrumentation Program. The program was initiated in FY 1984 to help support the purchase, on a competitive and cost-shared basis, by university researchers of state-of-the-art instrumentation over \$100,000 in purchase price.

In FY 1984, 17 competitive awards were made for instruments to support energy-related research in the following research areas: biological energy conversion, nuclear waste isolation, combustion, and multiphase and fluid flow phenomena. In FY 1985, 23 awards were made for instrumentation in the following fields: catalysis, advanced materials characterization, biological energy conversion, geosciences and CO<sub>2</sub> research, and health/environmental impacts of energy-related chemicals. In FY 1986 it is anticipated that 20 to 25 instrumentation awards will be granted. Examples of awards made to universities in both the FY 1984 and FY 1985 University Research Instrumentation program included such instruments as: a scanning Auger microprobe, a tunable dye laser system and several spectrometers (NMR, Ellipsometric, Thermal Ionization Mass, etc.)

	<u>FY 1985</u>	<u>FY 1986</u>	<u>FY 1987 Request</u>
University Research Instrumentation.....	\$ 4,950	\$ 6,254	\$ 5,000

The FY 1987 request for the University Research Instrumentation Program is \$5,000,000. This level will support an estimated 15 to 18 competitively selected awards for instrumentation costing over \$100,000. As in prior years, the program will concentrate on providing instrumentation support to university research groups which have already demonstrated significant expertise in one of a small number of

high priority energy-related topics which are of special concern to the Department's research programs. Among the topics to be considered in FY 1987 are: catalysis, materials characterization and analyses, the geological sciences and health effects research. Specific topics will be selected following discussions with both DOE program staff and university scientists.

The University Research Instrumentation Program remains complementary to but does not replace the Department's efforts to provide support for scientific equipment required on individual research projects supported through the various research programs.