DOE/CE-0002

U. S. Department of Energy
Assistant Secretary for
Conservation and Renewable Energy

March 1981

Revised Congressional Budget Request FY 1982

Conservation and Renewable Energy Program

United States Department of Energy

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REVISED CONGRESSIONAL BUDGET REQUEST

FY 1982

VOLUME 7

ENERGY CONSERVATION
STRATEGIC PETROLEUM RESERVE
ECONOMIC REGULATION
ENERGY INFORMATION ADMINISTRATION

FEBRUARY 1981
U.S. DEPARTMENT OF ENERGY
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

NOTE: Only those pages from Volume 7 of the DOE FY 1982 Revised Congressional Budget Request, pertaining to Conservation and Renewable Energy programs, have been included herein.

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
Funding Summary by Major Program or Function
(Budget Authority in Thousands)

	FY 1981			FY 1982		
	Enacted Appropriation[a]	Proposed Rescission	Reagan Budget	Carter Budget	Change	Reagan Budget
Solar Energy[b]	$ 587,176[c]	$ - 100,650	$ 486,526	$ 583,450	$ - 390,150	$ 193,300
Energy Storage Systems	71,800	- 19,933	51,867	59,500	- 20,500	39,000
Electric Energy Systems	39,923	- 4,882[d]	35,041	39,900	- 29,000	9,900
Geothermal Energy	156,021	- 13,500	142,521	91,575	- 43,200	48,375
Geothermal Resource Development Fund	1,284	- 22,066[d]	- 20,782	5,574	- 5,374	200
Hydropower	21,800	- 24,546[d]	- 2,746	3,200	- 3,200	0
Buildings and Community Systems	113,770	- 51,770	62,000	99,505	- 68,405	31,100
Industry	89,700	- 46,700	43,000	51,618	- 50,653	955
Transportation	119,650	- 38,650	81,000	121,691	- 83,411	38,280
State and Local	452,887	- 116,925	335,962	538,593	- 431,628	106,965
Energy Impact Assistance	62,000	- 52,000	10,000	47,550	- 47,550	0
Residential/Commercial Retrofit	(26,165)[e]	(- 19,965)	(6,200)	31,050	- 31,050	0
Multi-Sector	26,500	0	26,500	31,651	- 13,961	17,690
Power Marketing Administrations	174,879	0	174,879	242,818[f]	0	242,818
GRAND TOTAL	$1,917,390	$ - 491,622	$1,425,768	$1,946,675	$-1,218,082	$ 728,593

a/ Excludes pay cost supplemental requests.
b/ Includes Alcohol Fuels activity.
c/ An FY 1981 congressional reduction of $20.2 million has been subtracted from amounts appropriated for Solar Technology line-items.
d/ Reflects proposed rescission of both prior-year unobligated balances and FY 1981 budget authority.
e/ FY 1981 funds for this program were appropriated to Buildings and Community Systems. FY 1981 amounts are treated as non-add items.
f/ Amount excludes a Bonneville Power Administration (BPA) FY 1982 estimate of borrowing authority ($136.2 million) related to its revolving fund. BPA is a self-financing public enterprise. As a result, amounts represent total appropriations provided or requested for the four other power marketing administrations (Alaska, Southeastern, Southwestern, and Western Area).

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
CS Funding Detail by Program, Subprogram, and Account Type (OE, CE, PL)
(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
A. Solar Energy - Energy Supply R&D Appropriation (ESRD)								
1. Active Solar Heating and Cooling								
Operating	$ 39,450	$ -2,300	$ 37,150	$ 32,000	$-21,000	$ 11,000	$ -28,450	$ -26,150
Capital Equipment	1,250	0	1,250	500	-0	500	-750	-750
Total	40,700	-2,300	38,400	32,500	-21,100	11,500	-29,200	-26,900
2. Passive Solar Heating and Cooling								
Operating	31,200	-1,500	29,700	31,450	-21,350	10,100	-21,110	-19,600
Capital Equipment	500	0	500	300	-300	200	-300	-300
Total	31,700	-1,500	30,200	31,950	-21,650	10,300	-21,400	-19,900
3. Photovoltaic Energy Systems								
Operating	147,200	-21,000	126,200	154,550	-98,650	55,900	-91,300	-70,300
Capital Equipment	7,000	0	7,000	7,000	0	7,000	0	0
Total	154,200	-21,000	133,200	161,550	-98,650	162,900	-91,300	-70,300
4. Thermal Energy Systems								
Operating	105,650	-18,050	87,600	76,300	-33,650	42,650	-63,000	-44,950
Capital Equipment	4,250	0	4,250	4,000	-2,650	1,350	-2,900	-2,900
Construction	31,850[a/]	0	31,850	5,000	-5,000	0	-31,850	-31,850
Total	141,750	-18,050	123,700	85,300	-41,300	44,000	-97,750	-79,700
5. Biomass Energy Systems								
Operating	41,750	-14,850	26,900	53,450	-33,950	19,500	-22,250	-7,400
Capital Equipment	750	-450	300	2,500	-1,500	1,000	+250	+700
Total	42,500	-15,300	27,200	55,950	-35,450	20,500	-22,000	-6,700

a/ Includes $8.0 Million for Barstow project deferred from FY 1980.

NOTE: An FY 1981 Congressional reduction of $20.2 million has been subtracted from amounts appropriated for Solar Technology line-items 1, 2, 3, 5 and 6.

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(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
6. Wind Energy Systems								
Operating	$ 78,200	$ -25,600	$ 52,600	$ 71,600	$-52,400	$ 19,200	$ -59,000	$ -33,400
Capital Equipment	2,100	-500	1,600	2,000	-1,800	200	-1,900	-1,400
Construction	0	0	0	0	-0	0	0	0
Total	80,300	-26,100	54,200	73,600	-54,200	19,400	-60,900	-34,800
7. Ocean Energy Systems								
Operating	$ 38,300	$ -4,400	$ 33,900	$ 36,050	$-36,050	$ 0	$ -38,300	$ -33,900
Capital Equipment	700	0	700	700	-700	0	-700	-700
Construction	0	0	0	0	-0	0	0	0
Total	39,000	-4,400	34,600	36,750	-36,750	0	-39,000	-34,600
8. International Solar Energy								
Operating	12,000	-1,200	10,800	12,950	-8,950	4,000	-8,000	-6,800
9. Information Systems								
Operating	1,400	0	1,400	12,650	-5,950	6,700	+5,300	+5,300
10. Solar Energy Research Institute								
Construction	5,000	0	5,000	23,800	-23,800	0	-5,000	-5,000
11. Alcohol Fuels								
Operating	$ 20,800	$ -2,800	$ 18,000	$ 32,600	$-22,600	$ 10,000	$ -10,800	$ -8,000
Construction	2,500	-2,500	0	0	0	0	-2,500	0
Total	23,300	-5,300	18,000	32,600	-22,600	10,000	-13,300	-8,000
12. MX-RES								
Operating	0	0	0	9,500	-9,500	0	0	0

NOTE: An FY 1981 Congressional reduction of $20.2 million has been subtracted from amounts appropriated for Solar Technology line-items 1, 2, 3, 5 and 6.

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
CS Funding Detail by Program, Subprogram, and Account Type (OE, CE, PL)
(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
13. Program Direction	6,786	0	6,786	6,860	-2,860	4,000	-2,786	-2,786
Total Solar Energy - Energy Supply R&D Appropriation								
Total Operating	522,736	-91,700	431,036	529,960	-346,910	183,050	-339,686	-247,986
Total Capital Equipment	16,550	-950	15,600	17,200	-6,950	10,250	-6,300	-5,350
Total Construction	39,350	-2,500	36,850	28,800	-28,800	0	-39,350	-36,850
14. Total	578,636	-95,150	483,486	575,960	-382,660	193,300	-385,336	-290,186
B. Solar Energy - Energy Production, Demonstration and Distribution Appropriation (PDD)								
15. Federal Buildings								
Operating	$ 1,800	$ 0	$ 1,800	$ 0	$ 0	$ 0	$ -1,800	$ 1,800
16. Market Analysis								
Operating	6,000	-5,500	500	6,750	-6,750	0	-6,000	-500
17. Program Direction	740	0	740	740	-740	0	-740	-740
18. Total, Operating - Energy PDD Appropriation	8,540	-5,500	3,040	7,490	-7,490	0	-8,540	-3,040
(A&B) Total CS Solar Energy - All Appropriations								
Operating	531,276	-97,200	434,076	537,450	-354,400	183,050	-348,226	-251,026
Capital Equipment	16,550	-950	15,600	17,200	-6,950	10,250	-6,300	-5,350
Construction	39,350	-2,500	36,850	28,800	-28,800	0	-39,350	-36,850
19. Total, CS Solar Energy (ESRD and EPDD)	587,176	-100,650	486,526	583,450	-390,150	193,300	-393,876	-293,226

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C. Other Renewables - Energy Supply R&D Appropriation								
Energy Storage Systems								
20. Electrochemical								
Operating	37,800	-10,918	26,882	30,600	-5,050	25,550	-12,250	-1,332
Capital Equipment	700	-300	400	700	0	700	0	+300
Total	38,500	-11,218	27,282	31,300	-5,050	26,250	12,250	-1,032
21. Physical and Chemical Storage								
Operating	31,300	-8,415	22,885	26,000	-14,150	11,850	-19,450	-11,035
Capital Equipment	1,000	-300	700	1,200	-800	400	-600	-300
Total	32,300	-8,715	23,585	27,200	-14,950	12,250	-20,050	-11,335
22. Program Direction.	1,000*	0	1,000	1,000	-500	500	-500	-500
Total Energy Storage								
Operating	70,100	-19,333	50,767	57,600	-19,700	37,900	-32,200	-12,867
Capital Equipment	1,700	-600	1,100	1,900	-800	1,100	-600	0
23. Total	71,800	-19,933	51,867	59,500	-20,500	39,000	-32,800	-12,867
Electric Energy Systems								
24. Power Delivery								
Operating	18,500	-1,510	16,990	18,450	-13,925	4,525	-13,975	-12,465
Capital Equipment	1,500	0	1,500	400	0	400	-1,100	-1,100
Total	20,000	-1,510	18,490	18,850	-13,925	4,925	-15,075	-13,565

*Does not include pay cost supplemental

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25. Power Supply Integration								
Operating	19,000	-2,270	16,712	13,000	-8,900	4,100	-14,900	-12,612
25B. Generation and Storage Applications								
Operating	0	0	0	6,300	-6,300	0	0	0
26. Program Direction								
Operating	923	-335	588	750	+125	875	- 48	+287
Total Electric Energy Systems								
Operating	38,423	-4,115	34,308	38,500	-29,000	9,500	-28,923	-24,808
Capital Equipment	1,500	0	1,500	400	0	400	-1,100	-1,100
Construction (Power Delivery)	0	-767 b/	-767	0	0	0	0	+767
27. Total	39,923	-4,882	35,041	38,900	-29,000	9,900	-30,023	-25,141
Geothermal Energy								
28. Hydrothermal								
Operating	$ 49,024	$ -5,374	$ 43,650	$ 11,140	$ -9,016	$ 2,124	$ -46,900	$ -41,526
Capital Equipment	0	0	0	163	-163	0		0
Construction	18,911	-4,000	14,911	23,736	-19,860	3,876	-15,035	-11,035
Total	67,935	-9,374	58,561	35,039	-29,039	6,000	-61,935	-52,561

b/ Reflects a proposed rescission of unobligated construction funds related to High-Bay Addition project (78-1-a) at Los Alamos Scientific Laboratory, New Mexico, previously authorized but no longer required.

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29. Geopressured Resources								
Operating	$ 35,600	$ -1,865	$ 33,735	$ 26,236	$ -5,900	$ 20,336	$ -15,264	$ -13,399
Capital Equipment	200	0	200	200	-200	0	-200	-200
Total	35,800	-1,865	33,935	26,436	-6,100	20,336	-15,464	-13,599
30. Geothermal Technology Development								
Operating	$ 48,800	$ -2,261	$ 46,539	$ 27,600	$ -8,024	$ 19,576	$ -29,224	$ -26,963
Capital Equipment	1,110	0	1,110	500	+363	863	-247	-247
Total	49,910	-2,261	47,649	28,100	-7,661	20,439	-29,471	-27,210
31. Program Direction								
Operating	2,376	0	2,376	2,000	-400	1,600	-776	-776
Total Geothermal								
Operating	$ 135,800	$ -9,500	$ 126,300	$ 66,976	$-23,340	$ 43,636	$ -92,164	$ -82,664
Capital Equipment	1,310	0	1,310	863	0	863	-447	-447
Construction	18,911	-4,000	14,911	23,736	-19,860	3,876	-15,035	-11,035
32. Total	156,021	-13,500	142,521	91,575	-43,200	48,375	-107,646	-94,146

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33. Geothermal Resource Development Fund								
Operating	1,284	-22,066 c/	-20,782	5,574	-5,374	200	-1,084	+20,982
34. Hydropower								
Operating	21,800	-24,546 d/	-2,746	3,200	-3,200	0	-21,800	+2,746
Other Renewables (ES R&D)								
Total Operating	267,407	-79,560	187,847	171,850	- 80,614	91,236	-176,171	-96,611
Total Capital Equipment	4,510	-600	3,910	3,163	-800	2,363	-2,147	-1,547
Total Construction	18,911	-4,767	14,144	23,736	-19,860	3,876	-15,035	-10,268
35. Total	290,828	-84,927	205,901	198,749	-101,274	97,475	-193,353	-108,426
D. Conservation - Energy Conservation Appropriation								
Buildings and Community Systems (BCS):								
36. Building Systems								
Operating	$ 33,825	$ -23,205	$ 10,620	$ 26,714	$ -9,167	$ 17,547	$ -16,278	$ 6,927
Capital Equipment	500	---	500	353	---	353	-147	-147
Total	34,325	-23,205	11,120	27,067	-9,167	17,900	-16,425	6,780

c/ Prior-year unobligated funds for loan guarantee reserve fund amounting to $21,982,000 are included.
d/ Reflects proposed rescission of $14,147,000 portion of this program's FY 1980 unobligated carryover linked to Feasibility Study Loans subprogram. The $10,399,000 balance of the proposed rescission is applied to budget authority appropriated in FY 1981.

FY 1982 Request to Congress
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37. Residential Conservation Service								
Operating	$ 14,665	$ -5,655	$ 9,010	$ 6,821	$ -6,821	$ ---	$ -14,665	$ -9,010
Capital Equipment	200	---	200	---	---	---	-200	-200
Total	14,865	-5,655	9,210	6,821	-6,821	---	-14,865	-9,210
38. Community Systems								
Operating	$ 13,550	$ -5,192	$ 8,358	$ 10,316	$-10,316	$ ---	$ -13,550	$ -8,358
Capital Equipment	250	---	250	109	-109	---	-250	-250
Total	13,800	-5,192	8,608	10,425	-10,425	---	-13,800	-8,608
39. Small Business								
Operating	750	-650	100	1,008	-1,008	---	-750	-100
40. Technology/Consumer Products								
Operating	$ 20,100	$ -7,630	$ 12,470	$ 22,949	$-22,949	$ ---	$ -20,100	$ -12,470
Capital Equipment	200	---	200	326	-326	---	-200	-200
Total	20,300	-7,630	12,670	23,275	-23,275	---	-20,300	-12,670
41. Appliance Standards								
Operating	$ 6,000	$ -2,258	$ 3,742	$ 5,779	$ -5,779	$ ---	$ -6,000	$ -3,742
42. Analysis/Technology Transfer								
Operating	$ 5,900	$ -2,100	$ 3,800	$ 5,661	$ -5,661	$ ----	$ -5,900	$ -3,800
Capital Equipment	0	---	---	87	-87	---	---	---
Total	5,900	-2,100	3,800	5,748	-5,748	---	-5,900	-3,800
43. Federal Energy Management Program								
Operating	$ 1,000	$ -470	$ 530	$ 3,082	$ -1,982	$ 1,000	$ ---	$ + 470

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44. Urban Waste								
Operating	$ 10,100	$ -5,110	$ 4,990	$ 8,950	$ + 50	$ 9,000	$ -1,100	$ +4,010
Capital Equipment	800	---	800	109	-9	100	-700	-700
Total	10,900	-5,110	5,790	9,059	+ 41	9,100	-1,800	+3,310
45. Emergency Building Temperature Restrictions								
Operating	-500	500	---	---	---	---	+500	---
45B. Program Direction	6,430	---	6,430	7,241	-4,141	3,100	-3,330	-3,330
Total, Buildings and Community Systems								
Operating	$ 111,820	$ -51,770	$ 60,050	$ 98,521	$-67,874	$ 30,647	$ -81,173	$- 29,403
Capital Equipment	1,950	---	1,950	984	-531	453	-1,497	-1,497
46. Total Buildings and Community Systems	113,770	-51,770	62,000	99,505	-68,405	31,100	-82,670	-30,900
Industrial Energy Conservation (IE):								
47. Waste Energy Reduction								
Operating	$ 24,800	$ -10,000	$ 14,800	$ 16,698	$-16,698	$ 0	$ -24,800	$ -14,800
48. Industrial Process Efficiency								
Operating	$ 36,800	$ -22,132	$ 14,668	$ 15,546	$-15,546	$ 0	$ -36,800	$ -14,668
Capital Equipment	1,000	-768	232	1,000	-1,000	0	-1,000	-232
Total	37,800	-22,900	14,900	16,546	-16,546	0	-37,800	-14,900
49. Cogeneration								
Operating	$ 16,500	$ -8,500	$ 8,000	$ 9,496	$ -9,496	$ 0	$ -16,500	$ -8,000
Capital Equipment	0	---	---	0	0	0	0	0
Total	16,500	-8,500	8,000	9,496	-9,496	0	-16,500	-8,000

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50. Implementation and deployment								
Operating	$ 7,500	$ 4,800	$ 2,700	$ 5,560	$ -5,560	$ 0	$ -7,500	$ -2,700
50B. Program Direction	$ 3,100	$ 500	$ 2,600	$ 3,318	$ -2,353	$ 965	$ -2,135	$ -1,635
Total, Industry								
Operating	$ 88,700	$ -45,932	$ 42,768	$ 50,618	$-49,653	$ 965	$ -87,735	$ -41,803
Capital Equipment	1,000	-768	232	1,000	-1,000	0	-1,000	-232
51. Total, Industry	89,700	-46,700	43,000	51,618	-50,653	965	-88,735	-42,035
Transportation (TP)								
52. Vehicle Propulsion RD&D								
Operating	$ 67,400	$ -26,500	$ 40,900	$ 58,400	$-47,400	$ 11,000	$ -56,400	$ -29,900
Capital Equipment	500	0	500	0	0	0	-500	-500
Total	67,900	-26,550	1,4000	58,400	-47,400	12,000	-56,900	-30,400
53. Electric/Hybrid Vehicle RD&D								
Operating	$ 36,820	$ -9,550	$ 27,270	$ 45,350	$-25,750	$ 19,600	$ -17,220	$ -7,670
54. Transportation Systems Utilization								
Operating	$ 6,700	$ -1,800	$ 4,900	$ 9,170	$ -8,170	$ 1,000	$ -5,700	$ -3,900
Capital Equipment	0	0	0	60	-60	0	0	0
Total	6,700	-1,800	4,900	9,230	-8,230	1,000	-5,700	-3,900
55. Alternative Fuels Utilization								
Operating	$ 4,300	$ -425	$ 3,875	$ 5,170	$ -20	$ 5,150	$ 850	$ +1,275
Capital Equipment	1,000	-375	625	250	0	250	-750	-375
Total	5,300	-800	4,500	5,420	-20	5,400	- 100	-900

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
CS Funding Detail by Program, Subprogram, and Account Type (OE, CE, PL)
(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
Transportation, continued								
56. Program Direction	2,930	0	2,930	3,291	-2,011	1,280	-1,650	-1,650
Total, Transportation								
Total Operating	$ 118,150	$ -38,275	$ 79,875	$ 121,381	$-83,351	$ 38,030	$ -80,120	$ -41,845
Total Capital Equipment	1,500	-375	1,125	310	-60	250	-1,250	-875
57. Total, Transportation	$ 119,650	$ -38,650	$ 81,000	$ 121,691	$-83,411	$ 38,280	-81,370	-42,720
State and Local Programs								
59. Schools and Hospitals								
Grants	$ 178,750	$-104,150	$ 74,600	$ 185,000	$ -93,000	$ 92,000	$ -86,750	$ -17,400
Contracts	2,500	+4,200	6,700	15,000	-7,000	8,000	-5,500	+1,300
Total Operating	$ 181,250	$ -99,950	$ 81,300	$ 200,000	$-100,000	$ 100,000	$ -81,250	$ -18,700
60. Local Government Buildings								
Grants	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Contracts	0	0	0	0	0	0	0	0
Total Operating	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
61. Emergency Energy Conservation								
Grants	$ 10,000	$ -8,347	$ 1,653	$ 16,100	$ -16,100	$ 0	$ -10,000	$ -1,653
Contracts	2,000	-1,653	347	8,400	-6,400	2,000	0	+1,653
Total Operating	$ 12,000	$ -10,000	$ 2,000	$ 24,500	$ -22,500	$ 2,000	$ -10,000	$ 0
62. Weatherization								
Grants	$ 179,975	$ -6,975	$ 173,000	$ 193,000	$-193,000	$ 0	$-179,975	$-173,000
Contracts	2,000	0	2,000	7,000	-7,000	0	-2,000	-2,000
Total Operating	$ 181,975	$ -6,975	$ 175,000	$ 200,000	$-200,000	$ 0	$-181,975	$-175,000

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
CS Funding Detail by Program, Subprogram, and Account Type (OE, CE, PL)
(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
63. Energy Management Partnership Act								
Grants	$ 0	$ 0	$ 0	$ 94,600	$ -94,600	$ 0	$ 0	$ 0
Contracts	0	0	0	7,000	-7,000	0	0	0
Total Operating	$ 0	$ 0	$ 0	$ 101,600	$-101,600	$ 0	$ 0	$ 0
64. Energy Policy and Conservation Grant Program (EPCA)								
Grants	$ 35,300	$ 0	$ 35,300	$ 0	$ 0	$ 0	$ -35,300	$ -35,300
Contracts	2,500	0	2,500	0	0	0	-2,500	-2,500
Total Operating	$ 37,800	$ 0	$ 37,800	$	$ 0	$ 0	$ -37,800	$ -37,800
65. Energy Conservation and Production Grant Programs (ECPA)								
Grants	$ 9,300	$ 0	$ 9,300	$ 0	$ 0	$ 0	$ -9,300	$ -9,300
Contracts	700	0	700	0	0	0	-700	-700
Total Operating	$ 10,000	$ 0	$ 10,000	$ 0	$ 0	$ 0	$ -10,000	$ -10,000
66. Energy Extension Service								
Grants	$ 18,500	$ 0	$ 18,500	$ 0	$ 0	$ 0	$ -18,500	$ -18,500
Contracts	1,500	0	1,500	0	0	0	-1,500	-1,500
Total Operating	$ 20,000	$ 0	$ 20,000	$ 0	$ 0	$ 0	$ -20,000	$ -20,000
67. Program Direction	9,862	0	9,862	12,493	-7,528	4,965	-4,897	-4,897
68. Total Operating, State and Local	452,887	-116,925	335,962	538,593	-431,628	106,965	-345,922	-228,997
Multi-Sector								
69. Appropriate Technology								
Operating	$ 12,000	$ 0	$ 12,000	$ 13,790	$-13,790	$ 0	$ -12,000	$ -12,000

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
CS Funding Detail by Program, Subprogram, and Account Type (OE, CE, PL)
(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
70. Invention Program								
Operating	$ 5,800 e/	$ 0	$ 5,800	$ 5,370	$ +30	$ 5,400	$ -400	$ -400
71. Energy Conversion and Utilization Technology								
Operating	$ 8,000	$ 0	$ 8,000	$ 11,675	$ +25	$ 11,700	$ +3,700	$ -3,700
Capital Equipment	0	0	0	385	+15	400	+400	+400
Total	8,000	0	8,000	12,060		12,100	+ 4,100	+4,100
72. Program Direction	700	0	700	431	-241	190	-510	-510
Total, Multi-Sector								
Total Operating	$ 26,500	$ 0	$ 26,500	$ 31,266	$-13,976	$ 17,290	$ -9,210	$ -9,210
Total Capital Equipment	0	0	0	385	+15	400	+400	+400
		0						
73. Total, Multi-Sector	26,500	0	26,500	31,651	-13,961	17,690	-8,810	-8,810
74. Energy Impact Assistance								
Operating	62,000	-52,000	10,000	47,550	-47,550	0	-62,000	-10,000
75. Residential/Commercial Retrofit f/								
Operating	(26,165)	(-19,965)	(6,200)	31,050	-31,050	0	(-26,165)	(-6,200)
Total Conservation Appropriation								
Total Operating	860,057	-304,902	555,155	918,979	-725,082	193,897	-666,160	-361,258
Total Capital Equipment	4,450	-1,143	3,307	2,679	-1,576	1,103	-3,347	-2,204
76. Total, Conservation	864,507	-306,045	558,462	921,658	-726,658	195,000	-669,507	-363,462
80. TOTAL, CE (Excluding PMAs)	1,742,511	-491,662	1,250,889	1,703,857	-1,218,082	485,775	-1,256,736	-765,114

e/ Includes $2.4 million for NBS (budgeted for in the Departmental Administration appropriation).
f/ FY 1981 funds were appropriated to Buildings Systems ($16,500,000) and Residential Conservation Service ($9,665,000) subprogram elements of ECS.

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
CS Funding Detail by Program, Subprogram, and Account Type (OE, CE, PL)
(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
E. Power Marketing - Multiple Appropriations by Administration								
81. Alaska Power Administration Operation and Maintenance	$ 3,069[g/]	$ 0	$ 3,069	$ 3,538[h/]	$ 0	$ 3,538	$ +469	$ +469
82. Bonneville Power Administration Revolving Fund	0	0	0	136,180[i/]	0	136,180	+136,180	+136,180
83. Southeastern Power Administration Operation and Maintenance	1,552[k/]	0	1,552	7,237[l/]	0	7,237	+5,685	+5,685
84. Southwestern Power Administration Operation and Maintenance	28,208[m/]	0	28,208	21,269[n/]	0	21,269	-6,939	-6,939
Western Area Power Administration								
85. Western Area Administration	138,502[o/]	0	138,502	210,774[p/]	0	210,774	+72,272	+72,272
86. Colorado River Basin Fund	3,548[q/]	0	3,548	0	0	0	-3,548	-3,548
87. Total	142,050	0	142,050	210,774	0	210,774	+68,724	+68,724

g/ Excludes a proposed pay raise supplemental of $150,000.
h/ Includes a $50,000 amount for an emergency fund.
i/ Bonneville Power Administration (BPA), a semi-autonomous organization under the DOE umbrella, is unique in that no appropriated funds are provided for its operations. This public enterprise is financed from a revolving fund and uses revenues collected from its customers to pay for its expenses.
j/ This is an estimate of FY 1982 usage of borrowing authority, identified in response to OMB requirement for first time.
k/ Excludes a $95,000 pay cost supplemental.
l/ Includes $50,000 continuing fund available to defray expenses necessary to insure continuity of service.
m/ Excludes $320,000 pay cost supplemental.
n/ Excludes $300,000 available for emergency expenses incurred to insure continuity of service.
o/ Excludes a $2,900,000 pay cost supplemental. Includes $200,000 for an emergency fund.
p/ Excludes $500,000 for the emergency fund.
q/ Excludes $80,000 pay cost supplemental.

FY 1982 Request to Congress
CONSERVATION AND RENEWABLE ENERGY
CS Funding Detail by Program, Subprogram, and Account Type (OE, CE, PL)
(Budget Authority in Thousands)

Program, Subprogram, Account	FY 1981 Enacted Appropriation (A)	FY 1981 Proposed Rescission	FY 1981 Reagan Budget (B)	FY 1982 Carter Budget	FY 1982 Change	FY 1982 Reagan Budget (C)	Other Comparisons Δ C-A	Other Comparisons Δ C-B
88. Total, Power Marketing.....	$174,879	$ 0	$174,879	$378,998	$ 0	$378,998	$+204,119	$+204,119
89. Total, Adjusted to Exclude Borrowing Authority*.....	174,879	0	174,879	242,818	0	242,818	+67,939	+67,939
90. GRAND TOTAL, CONSERVATION AND RENEWABLE ENERGY..... (Sum of Lines 80 and 89)	$1,917,390	$-491,622	$1,425,768	$1,946,675	$-1,218,082	$728,593	$-1,188,797	$-697,175

*Adjustment line introduced to preclude combining requests for new budget authority (BA) and borrowing authority estimates. The BPA FY 1982 estimate is, consequently, treated as a non-add item for computation of the CE Grand Total.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY CONSERVATION

VOLUME 7

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DEPARTMENT OF ENERGY

Appropriation Language

Energy Conservation

For necessary expenses in carrying out energy conservation activities, [$862,107,000] $195,000,000, to remain available until expended[: Provided, That of the total amount of this appropriation, not to exceed $1,100,000 shall be available for a reserve to cover any defaults from loan guarantees issued for electric or hybrid vehicle research, development, and production as authorized by section 10 of the Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976, as amended, (15 U.S.C. 2509): Provided further, That the indebtedness guaranteed or committed to be guaranteed under said law shall not exceed the aggregate of $21,500: Provided further, That none of the funds provided for State energy conservation grants shall be available to any jurisdiction that has not implemented section 362(c)(5) of Public Law 94-163: Provided further, That for the purposes of section 601 of the Powerplant and Industrial Fuel Use Act of 1978, the term "local government" shall include--

(1) any county, parish, city, town, township, village or other general purpose political subdivision of a State with the power to levy taxes and expend Federal, State, and Local funds and exercise governmental powers; and

(2) which (in whole or in part) is located in, or has authority over the energy impacted area: Provided further, That such term shall include a public or private nonprofit corporation, or a school, water, sewer. highway, or other public special purpose district, authority, or body, with the concurrence of the Governor: Provided further, That such term shall be applicable to all applications for assistance received since the effective date of section 601 of the Powerplant and Industrial Fuel Use Act of 1978].1/

Explanation of Changes

1/ No funds requested for loan guarantee reserve in FY 1982. Restrictive language pertaining to P.L. 94-163 is no longer necessary.

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

ENERGY CONSERVATION

	FY 1982 Budget Request Pending	FY 1982 Proposed Amendment	FY 1982 Revised Request
Executive level I	—		—
Executive level II	—		—
Executive level III	—		—
Executive level IV	—		—
Executive level V	—		—
Subtotal	—		—
ES-6	—		—
ES-5	3		3
ES-4	5		5
ES-3	1		1
ES-2	4		4
ES-1	10		10
Subtotal	23	—	23
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—		—
GS-18	—		—
GS-17	—		—
GS-16	—		—
GS/GM-15	64	-36	28
GS/GM-14	69	-41	28
GS/GM-13	120	-72	48
GS-12	65	-40	25
GS-11	47	-26	21
GS-10	—		—
GS-9	34	-16	18
GS-8	12	-9	3
GS-7	55	-32	23
GS-6	34	-21	13
GS-5	44	-25	19
GS-4	14	-8	6
GS-3	11	-6	5
GS-2	5	-3	2
Subtotal	574	-335	239
Ungraded	—		
Total permanent positions	597	-335	262
Unfilled positions, end of year	—		—
Total permanent employment end of year	597	-335	262

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

ENERGY CONSERVATION
(in thousands of dollars)

	FY 1981	FY 1982
Appropriation	862,107	195,000
Proposed Rescissions	-306,045	---
Comparative Transfers To:		
Departmental Administration	2,400	---
Subtotal, Budget Authority	558,462	195,000
Unobligated Balances, Start of Year	83,405	---
Unobligated Balances, End of Year	---	---
Total Available For Obligation	641,867	195,000

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
ENERGY CONSERVATION
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Buildings and Community Systems.....	103,412	84,665	113,770	82,270	31,100	48,000
Industrial.....	60,242	49,863	89,700	74,300	965	28,000
Transportation.....	113,423	98,919	119,650	103,144	38,280	47,000
State and Local.....	441,536	306,642	452,887	447,887	106,965	350,000
Multi-Sector.....	19,055	18,054	26,500	21,561	17,690	16,000
Energy Impact Assistance.....	43,000	3,450	62,000	23,000	---	16,000
Residential and Commercial Retrofit....	---	---	---	---	---	---
Subtotal, Energy Conservation.....	780,668	561,593	864,507	752,162	195,000	505,000
Cost Outlay Adjustment	---	12,623	---	2,731	---	---
Subtotal, Energy Conservation.....	780,668	574,216	864,507	754,893	195,000	505,000
Proposed Rescission...	---	---	-306,045	-59,500	---	(-246,545)
Total, Energy Conservation.....	780,668	574,216	558,462	695,393	185,000	505,000

Department of Energy

FY 1982 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Buildings and Community Systems

The Buildings and Community Systems program is comprised primarily of a diverse set of long-term, generic and high risk, but potentially high payoff, research and development activities that are unlikely to be supported by the private sector alone. These activities are ancillary but complementary to the Administration's basic energy policy of allowing normal market forces to bring about the most effective and efficient use of energy resources.

Evidence that the private sector is undertaking conservation in response to rising energy prices and substantial Federal tax credits is clear. For example, in the six years after the Arab oil embargo, total U.S. energy consumption increased only six percent, compared with an increase of 29 percent in the six years prior to the embargo. Additionally, while fossil fuel prices in constant dollars have doubled since 1973, energy consumption per GNP dollar, perhaps the best indicator of the Nation's overall energy efficiency, has declined every year since that time, decreasing by a total of nine percent.

No longer will subsidies be provided for technology development projects that can be commercially viable without Federal assistance. Regulatory programs mandating buildings and appliance efficiency standards and utility conservation services have also been proposed for termination. Consumers already are demanding and manufacturers are producing more energy efficient products and buildings without Federal standards. Similarly, where conservation is an economic alternative to new generating capacity, utilities are developing their own conservation programs.

R&D efforts in FY 1982 will focus more narrowly on high potential projects that are unlikely to be supported by the private sector alone because they are high risk, generic and long term. One area of emphasis is basic research on the use of energy in buildings. This research will provide a fuller understanding of how energy efficiency can be achieved in new and existing structures. The research findings will be incorporated by architects, engineers and builders to achieve further increases in the energy efficiency of the built environment.

Longer term research on urban waste will also be continued and the Federal Government's internal conservation effort will be retained.

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Energy Conservation
Conservation
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Buildings and Community Systems (CS)				
Building Systems:				
Operating expenses.....	$ 17,350	$ 33,825 1/	$ 33,825 1/	$17,547
Capital Equipment.....	750	500	500	353
Subtotal.....	$ 18,100	$ 34,325	$ 34,325	$17,900
Residential:				
Operating expenses.....	$ 4,600	$ 14,665 1/	$ 14,665 1/	
Capital Equipment.....	0	200	200	
Subtotal.....	$ 4,600	$ 14,865	$ 14,865	-0-
Community Systems:				
Operating expenses.....	$ 16,550	$ 13,550	$ 13,550	
Capital Equipment.....	250	250	250	
Subtotal.....	$ 16,800	$ 13,800	$ 13,800	-0-
Small Business:				
Operating expenses.....	$ 700	$ 750	$ 750	
Capital Equipment.....	0	0	0	
Subtotal.....	$ 700	$ 750	$ 750	-0-
Technology & Consumer Products:				
Operating expenses.....	$ 29,600	$ 20,100	$ 20,100	
Capital Equipment.....	0	200	200	
Subtotal.....	$ 29,600	$ 20,300	$ 20,300	-0-
Appliance Standards:				
Operating expenses.....	$ 6,000	$ 6,000	$ 6,000	
Capital Equipment.....	0	0	0	
Subtotal.....	$ 6,000	$ 6,000	$ 6,000	-0-
Analysis & Tech Transfer:				
Operating expenses.....	$ 5,400	$ 5,900	$ 5,900	
Capital Equipment.....	0	0	0	
Subtotal.....	$ 5,400	$ 5,900	$ 5,900	-0-
Federal Energy Mgmt Program:				
Operating expenses.....	$ 400	$ 1,000	$ 1,000	$ 1,000
Capital Equipment.....	0	0	0	0
Subtotal.....	$ 400	$ 1,000	$ 1,000	$ 1,000

1/ FY 1981 funds were appropriated as follows:

BCS Subprogram	FY 1981 Appropriation
Buildings Systems	$ 34,325
Residential Conservation Services (RCS)	$ 14,865

Distribution of FY 1981 Appropriation

BCS Subprogram	Residential/Commercial Retrofit (R/CR) Program
	$ 16,500
$ 17,825	
$ 5,200	9,665
	$ 26,165

Urban Waste				
Operating expenses.....	$ 13,000	$ 10,100	$ 10,100	$ 9,000
Capital Equipment.....	0	800	800	100
Subtotal.....	$ 13,000	$ 10,900	$ 10,900	$ 9,100
Program Direction.....	$ 5,137	$ 6,430 1/	$ 6,430 1/	3,100
Emergency Building Temperature Restrictions				
Operating expenses.....	$ 0	$ - 500 2/	$ - 500 2/	$ 0
Total Operating Expenses...	98,737	$111,820	111,820	30,647
Total Capital Equipment....	1,000	1,950	1,950	453
Total, Buildings & Community Systems.....	$ 99,737	$113,770 3/	$113,770	$31,100

Authorization:

Energy Reorganization Act, P.L. 94-438
Energy Research and Development Act, P.L. 93-577 as amended
National Energy Conservation Policy Act, P.L. 95-619 (Sec. 224) (Parts 1, 2, 4)
Energy Conservation and Production Act, P.L. 94-385
DOE Organization Act, P.L. 95-91
Energy Tax Act, P.L. 95-618 (Title I)
National Energy Conservation Policy Act, P.L. 95-619 (Sec. 210-223)
National Energy Conservation Policy Act, P.L. 95-619 (Sec. 501, 541-0551)
Energy Policy and Conservation Act, P.L. 94-163 Part E (Sec. 381)
Energy Policy and Conservation Act, P.L. 94-163 (Sec. 201)
Energy Security Act, P.L. 96-294
Power Plant and Industrial Fuel Use Act of 1978
Emergency Energy Conservation Act of 1979

1/ Includes program direction funds for the R/CR program and Impact Assistance Programs.

2/ This negative amount will be applied against existing Energy Conservation programs in FY 1981.

3/ A BCS program rescission totalling $51,770,000 is proposed for FY 1981. Specific subprogram amounts and impacts are addressed subsequent to the "Summary of Changes" section.

SUMMARY OF CHANGES

FY 1981 Appropriation Enacted	$ 113,770
FY 1982 Base	$ 113,770
Program Increases and Decreases:	
Building Systems	
Termination of funding for Residential/Commercial Retrofit concept research, delivery system demonstrations	-16,500
Termination of education, technical assistance and short-term RD&D activities	- 3,825
Energy conversion equipment long-term R&D	+ 4,000
Capital Equipment - New initiatives require less capital equipment	- 100
Subtotal	-16,425
Residential Conservation Services	
Termination of all activities	-14,865
Community Systems	
Termination of all activities	-13,800
Small Business	
Termination of all activities	- 750
Technology & Consumer Products	
Termination of all activities	-20,300
Appliance Standards	
Termination of all activities	- 6,000
Analysis & Technology Transfer	
Termination of all activities	- 5,900
Urban Waste	
Delay waste water treatment project	- 900
Delay thermal projects	- 400
Terminate recycling project	- 500
Subtotal	- 1,800
Emergency Building Temperature Restrictions	
A Congressional reduction of $500,000 is not applied to requested budget authority of zero	+ 500
Program Direction	
Elimination of 72 full-time permanent positions	- 3,330
FY 1982 Budget Request	$ 31,100

Objectives and Federal Role: The mission of the Buildings and Community Systems program is primarily to provide support for long-term, generic and high risk, but potentially high payoff research and development efforts that can facilitate the achievement of increased energy efficiency in the design and use of residential and commercial buildings.

o Building Energy Sciences. The Federal strategy includes research and development activities of the type described above that the private sector would not undertake alone at this time. Most projects are leveraged with private funds. In other areas, there is a clear Federal interest but no easily identifiable private interest. For example, the tightening of building envelopes has caused concern for indoor air quality. There is no private interest in understanding this complex issue. However, if the public is concerned that energy conservation can lead to contaminated indoor air and adverse health effects, then conservation would suffer. There is a Federal interest in understanding and resolving this issue.

o Urban Waste. The primary purpose of this R&D program is to encourage either the production or conservation of energy by utilization of municipal wastes. Federal support is restricted to these potentially high payoff projects unlikely to be done by the private sector alone in the near term. Municipal waste is any organic matter, including sewage, sewage sludge, industrial or commercial waste, and inorganic refuse. Conservation of energy in municipal wastewater collection and treatment as well as production and distribution also are included.

o Federal Energy Management Programs. The strategy in this area is to achieve a cost-effective improvement in the energy-efficiency of the Federal government's own buildings and operations in order to reduce the costs of Federal operations.

Building Systems $34,325 $34,325 $17,900

The FY 1982 request for this subprogram of $17,900 represents an apparent decrease of $16,425,000 from the amount appropriated in FY 1981. This estimate, in fact, reflects a $75,000 increase over the prior-year level when the $16,500,000 dedicated to Residential/Commercial Retrofit projects is segregated from the total. A small fraction of the request, $353,000, is for capital equipment requirements associated with performance of tests, studies, pilot projects, and other activities funded from operating expense funds.

The requested funding will be applied largely to energy saving projects initiated in prior funding periods. These include research activities formerly managed under other subprograms and funding for some projects in advanced phases with emphasis on energy efficient building.

The Building Systems subprograms include long-term, generic and high risk Building Energy Science research and development (R&D) activities directed toward advancing the technical understanding of energy phenomena in both new and existing residential and commercial buildings. These activities focus on the energy efficiency of the entire building by examining the interaction of its component parts. Substantial gains in improving the energy efficiency of buildings can be achieved if these interactions are understood. The subprogram conducts research that is not done in the private sector. Technical program areas and the specific research agendas selected reflect close cooperation with the major segments of the diverse building industry. These include technical and professional societies, developers, manufacturers, suppliers, designers, builders, code organizations and educational institutions. Thus, sound programs are developed that reflect participation of the appropriate members of the building community and have a high probability of success. Building Energy Science programs are looked upon by the private sector as a source for competent research and technical data on energy efficient buildings.

Activities in Building Energy Sciences work toward increasing the understanding of energy gains and losses within buildings so that better strategies can be developed to reduce energy use. The program funds applied R&D in Ventilation & Controls, Envelope Systems & Materials, Performance Calculations & Diagnostics, Energy Conversion Equipment, Pilot Projects & Case Studies and Appliance Test Procedures.

The Ventilation & Controls subelement is comprised of three program areas; ventilation, infiltration and controls. The goal of the ventilation program is to determine minimum ventilation requirements and to develop energy efficient, economical ventilation strategies which meet those minimum requirements. The goal of the infiltration program is to understand the flow of air through holes in buildings, to develop design and retrofit techniques to reduce that air flow; to develop test methods and models to determine air infiltration rates in buildings. The goals of the controls program are to develop the strategies necessary to control the energy flow in a building efficiently and to transfer to building users the rapidly growing microprocessor technology.

Problem Significance: Reduced ventilation and infiltration rates are a primary strategy for conserving energy in buildings. There is a weak scientific basis for establishing minimum ventilation needs. And, current building codes vary by up to 600% on the amount of fresh air required for exactly the same function. Air infiltration is the largest fraction (25% to 33%) of the total heating load of houses and lightweight buildings. Systematic laboratory and field studies are required to insure that indoor air quality is not compromised but improved after audit and retrofit. Energy consumption can be reduced in residential buildings by 5% to 10% by utilizing better control strategies and in 1979 it was estimated that energy conserving control systems in non-residential buildings could accrue potential savings on the order of $2 billion per year.

The Envelope Systems & Materials subelement is comprised of three program areas; wall and roof systems, thermal insulation, and daylighting. The goal of the wall and roof systems program is to understand how the non-steady state transfer of heat, moisture, and air through the building shell (wall, floors, ceilings & roofs) perform under actual conditions; and to provide technical information to enable improvements in conventional building practices. The goal of the thermal insulation program is to develop new and improved test procedures and full scale apparatus to determine the effectiveness, durability and safety of insulation materials; and to understand thermal mass dynamic performance. The goal of the daylighting program is to develop effective strategies to minimize thermal loads and to maximize daylighting potential.

Problem Significance: Dynamic performance knowledge is so primitive today that current design practice unknowingly utilizes envelope systems and material components that counteract one another from an energy perspective. Ultimate improvements in energy efficiency of certain building types in the range of 5% to 15% can be expected.

The Performance Calculation & Diagnostics subelement is comprised of three areas; energy use estimating methods, energy audits, and diagnostics. The goal of the energy use estimating methods program is to develop mathematical methods for estimating the heat transfer through the building envelope and of the peak load and part load (off design) performance of heating andcooling equipment in buildings; to understand the system interactions between HVAC (heating, ventilation and air conditioning) systems, controls and the building envelope and to understand the effects of climate on building energy use; to develop these models in a fashion so that they can be used as design tools by the building community and to produce the technical data for simplified tools and reference manuals. The goal of the energy audit program is to develop accurate audits which include the use of instrumentation to determine whole building thermal performance; to develop software strategies which optimize retrofit selection. The goal of the diagnostics program is to develop the theories and strategies for tools needed by an auditor or energy manager to measure the energy performance of a building.

Problem Significance: Energy is a new design parameter for architects, engineers and builders. Greatly improved accuracy is needed to economically evaluate energy performance and retrofit options. Significant gains in energy efficient design can occur within existing fee structures if simple aids are available.

The Energy Conversion Equipment subelement is aimed at developing basic technical data on advanced technologies for improving the energy conversion equipment which heats, cools, and lights buildings. The subelement is comprised of three program areas: thermal conversion, refrigeration and lighting phenomena. The goal of the thermal conversion program is to provide technology advances in the conversion of oil, gas and solid fuels in building heating systems, including combustion processes (fuel atomization and airflow control), heat exchangers (condensing materials), and small heat engines. The goal of the refrigeration program is to develop analytical data on advanced refrigeration cycles; to develop design and optimization techniques for heat pump systems; and to develop basic data on advanced technologies for refrigeration system components (compressors and motors, heat transfer fluids, heat exchangers and insulation). The goal of the lighting program is to understand visibility and performance relationships to establish needed lighting levels to prevent overlighting of commercial buildings; to understand the health and environmental impacts of advanced energy efficient lighting; and to develop basic data on advanced technologies for lamp components (coatings, lenses, filaments, gas mixtures, isotopes, phosphors and ballasts).

Problem Significance: Improved energy conversion equipment is a primary strategy for conserving energy in buildings. Presently there is a lack of available data on advanced technologies which have significant potential for energy conservation when applied to buildings. For example, up to 60 percent of the energy used for space heating can be saved by development of advanced thermal conversion technologies. For most of these technologies, basic data and proof-of-concept analyses are not available to permit evaluation by private sector manufacturers.

The Appliance Test Procedure subelement is aimed at the development and update of standardized industry accepted test procedures utilized by all appliance manufacturers, distributors, and retailers when making representations regarding the energy consumption or the cost of energy consumed by the major residential appliances. The representations may be in writing such as the labels affixed under the Federal Trade Commission's Appliance Labeling Program, or in any broadcast advertisement. The goal of this program is to keep all test procedures updated, develop new test procedures as required, and process test procedure waivers submitted by manufacturers.

Problem Significance: Providing good, accurate energy data regarding the use of major residential appliances at the point of sale will result in the consumer making an informed choice regarding the purchase of energy conserving appliances. This concept is implemented through the FTC Labeling Program instituted in May 1980. For this labeling program to be successful, standardized test procedures for the various appliances are required to be developed and updated to ensure commonality of data.

The Pilot Projects & Case Studies subelement goals are to field test concepts developed in other areas of the building energy sciences program in real buildings under actual conditions; to analyze the relationship between energy efficiency and investments; and to develop cost effective design options that increase energy efficiency. A case study format is used to document building design and performance and inform the building community of advances in the state of the art.

Problem Significance: Theoretical analysis cannot predict actual performance without field tests to validate the algorithms. Many times, on site refinements solve key problems that pave the way for transfers of advances to the building industry.

In FY 1982, the data base on several patterns of energy use will be enlarged. A significant step will be taken by applying the "house doctor" technique to multi-family, low rise apartment buildings which will require detailed infiltration measurements. The understanding of non-steady state energy transfer caused by diurnal and seasonal weather changes will be individually advanced. New laboratory testing facilities which accept 10 ft. x 15 ft. samples and the operation of six 20 ft. x 20 ft. test cells with different wall treatments will start in 1982 at NBS. Sensitivity studies will be done to establish the effects of climate on energy use and comfort in buildings. Studies to measure actual energy consumption on several building types compared to design estimates will be completed. Examples of specific projects are listed in the Key Activity Summary's which follow.

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITY SUMMARY

BUILDING SYSTEMS

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
BUILDING ENERGY SCIENCES; Ventilation and Controls	Extend and validate the residential infiltration model. Laboratory test 3 heat exchanges used to control indoor air pollution; develop and validate analytical model based on data. Complete field study on heat exchangers used to retrofit homes in Rochester, N.Y. Complete a pilot study in establishing a data base on indoor air pollution levels before and after retrofit. Develop a National Program Plan for Building Energy Controls Research.	Collection of "before and and after" retrofit data on energy use and indoor air quality in residential buildings will be extended. Enlarge heat exchanger performance data base and draft laboratory test method for coordination as a standard. Draft technical data based on reduced infiltration rates and submit to ASHRAE for consideration. Develop public domain algorithms for use in control strageties.
BUILDING ENERGY SCIENCES; Envelope Systems and Materials	Build test cells at southwestern and northeastern sites and take preliminary data to determine the effect of natural thermal mass on energy transfer through walls. Complete capability to measure dynamic performance of wall sections in the field. Design a mobile test facility to measure fenestration performance under weather conditions.	Analyze first year data from 14 natural thermal mass test cells and draw preliminary conclusions. Validate dynamic test procedures for full wall sections through laboratory testing and submit them to ASHRAE for consideration. Build mobile test facility to determine net energy transfer through fenestration. Draft and submit to ASHRAE for consideration a corrosion test for all types of thermal insulation.

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITY SUMMARY

BUILDING SYSTEMS

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
BUILDING ENERGY SCIENCES; Energy Performance Calculations and Diagnostics	Identify diagnostic tools to measure a single energy performance parameter of a complete home. Update DOE 2.1 Energy Analysis program. Publish a simplified residential calculation procedure for use on a hand-held calculator. Establish prototypes for single family energy budgets development. Establish usage level of hot water in single family housing. Complete comparison of design energy budgets to actual energy use for 10 residences. Complete comparative test of alternate energy analysis tools. Establish relationship between climate variation and building energy use.	Design and fabricate a full house energy performance diagnostic tool followed by preliminary data on several homes. Establish prototypes for commercial and multi-family energy analysis. Continue development of simplified tools for building energy analysis.
BUILDING ENERGY SCIENCES; Energy Conversion Equipment	Complete testing of metallic materials for condensing heat exchanger. Complete lab test work on coal-oil mixtures for use in small boilers. Initiate basic combustion research for wood fuels. Continue laboratory tests of combustion modification techniques and fuel atomization. Complete & publish analytical work on air-cycle and Stirling cycles. Continue development of optimization techniques.	Complete testing of two-material, non-metallic heat exchangers for condensing systems. Continue basic wood combustion research. Complete a comprehensive analysis & screening of candidate advanced concepts and prioritize future work. Complete optimization program for Rankine cycle.

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITY SUMMARY

BUILDING SYSTEMS

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
	Continue work on mixed refrigerants, organic absorption fluids and advanced insulation. Continue advanced heat exchanger research for reduced heat pump frosting and ground-coupling.	Initiate compressor research efforts. Complete preliminary screening of absorption fluids. Continue work on mixed refrigeration organic fluids and advanced insulation. Complete test of direct expansion ground coils.
	Continue visibility and performance efforts, develop experimental procedures for visual performance. Initiate photobiological effects research. Continue research on lighting controls.	Continuation of visual performance and photobiological experiments, initiate results reported.
	Continue experiments in efficiency of various gas isotopes, initiate research on isotope separation.	Continue applied research in gas isotopes. Initiate research in fluorescent filaments and phosphors; initiate research in advanced ballast research improved coatings and lenses.
BUILDING ENERGY SCIENCES; Pilot Projects and Case Studies	Complete the following: the Minimum Energy Dwelling II Report; the Pittsburgh inner city housing demonstration guidelines; and the Newark, N.J. office building analysis using DOE 2.1 and ASHRAE 90-75 standard. Start data collection for the hotel/motel demonstration and report preliminary data. First year Brookhaven House data collection and analysis. Report on the double-shell Ekose's	Report on the hotel/motel demonstration study as well as the first year report on the new office building in Newark, N.J. Instrumentation and preliminary data collection on Pittsburgh housing demonstration and on nine Philadelphia restaurants. Initiate case studies on new commercial office buildings.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
	case study and begin analysis of two additional highly energy efficient houses. Complete design of federal energy efficient buildings. Initiate design and analysis of Energy efficient buildings in private sector.	Start design studies of energy efficient housing for the south and southwest resulting in building demonstrations as done at Brookhaven. Finish analysis and report case studies for the Brookhaven House, the Illinois Lo-cal super insulated house, and two other energy efficient houses. Complete analysis of design and construction of private sector energy efficient buildings.
Test Procedure Development	Support FTC Labeling Program with Test Procedure Updates. Support FTC Labeling Program with Consumer Education Activities. Issue Annual Update of Energy Prices. Process Requests for Waivers from Federal Test Procedures. Submit Annual Report to President and Congress.	Support FTC Labeling Program with Test Procedure Updates. Process Requests for Waivers from Federal Test Procedures.

Residential Conservation Service $14,865 $14,865 $0

The Residential Conservation Service (RCS) is being proposed for termination. If undertaken as proposed by the previous Administration, it would have required states and large gas and electric utilities to:

- o provide information to their residential customers on energy conservation and renewable resource measures;
- o offer home energy audits;
- o provide lists of suppliers, installers and lenders;
- o make arrangements for installations and financing of measures; and
- o inspect installations in some cases.

This program would have imposed massive regulatory burdens that would be a nightmare to administer and enforce. Where conservation is an economic alternative to new generating capacity, utilities already are developing their own conservation programs, for example, in Massachusetts, Oregon and California.

Community Systems.....	$13,800	$13,800	$0

The Community Systems program attempted to rationalize community energy use through an analysis perspective which viewed all energy producing and consuming elements as parts of a system. District Heating is probably the best known example. The program is being proposed for termination because projects like this have already proven that they can be commercially viable without Federal subsidies. Their continuation would be a waste of scarce tax revenues.

Industry already has sufficient incentive without direct subsidies to commercialize promising near-term technologies. Administration policies, such as petroleum price decontrol, increased investment tax incentives and an improved overall investment climate will free the marketplace to supply the capital investments required to support the commercial introduction of cost-effective alternative energy technologies into the economy.

Small Business.....	$750	$750	$0

This activity, which was aimed at reducing energy costs in and increasing the energy efficiency of small businesses, is being proposed for termination in FY 1982. In this area as well, the Administration's realistic energy policies provide sufficient incentives without direct subsidies for industry to support commercialization of promising near-term technologies. Administration policies, such as petroleum price decontrol, increased investment tax incentives and an improved overall investment climate will free the marketplace to supply the capital investments required to support the commercial introduction of cost-effective alternative energy technologies into the economy.

Technology and Consumer Products.....	$20,300	$20,300	$0

The Technology and Consumer Products subprogram conducted efforts to accelerate the development and commercialization of advanced, energy-conserving products for residential and commercial buildings in the areas of space heating and cooling (heat pumps, gas and oil equipment and solid fuel equipment), appliances and lighting; and conducted market development efforts to stimulate investment in energy-efficient products and increase consumer awareness of conservation practices. The high level of independent public investments in energy conservation, which will be accelerated by this Administration's energy policies, make it clear that this program has been unnecessary and wasteful of Federal tax revenues; therefore, it is being proposed for termination in FY 1982. Consumers already are demanding and manufacturers are producing more energy efficient products independently of the negligible impact of programs such as this.

High priority, generic and longer term research on conservation that the private sector is unwilling to undertake will continue in the Energy Conversion and Utilization Program in the Multi-Sector account.

Appliance Standards.....	$6,000	$6,000	$0

The primary objective of the program was to reduce energy consumption in the residential sector by requiring manufacturers to increase the operating efficiencies of major household consumer products. Current energy consumption trends evidence clearly the strong consumer interest in energy efficiency. This high and increasing level of consumer concern provides sufficient market signals to manufacturers to persuade them to introduce more energy-efficient products. A mandatory standards program would impose a massive regulatory burden on appliance manufacturers, that is wholly unnecessary in light of the sound market-oriented energy policy of this Administration.

No funds are requested for the Appliance Standards program in FY 1982.

Analysis and Technology Transfer.....	$5,900	$5,900	$0

The subprogram provided planning, analysis and evaluation support for the various other programs being proposed for termination. Therefore, these activities are also proposed for termination in FY 1982.

Federal Energy Management Program.	$1,000	$1,000	$1,000

The FY 1982 request to continue the conduct of this program is $1,000,000.

The purpose of the Federal Energy Management Program (FEMP) is to increase energy efficiency and reduce energy consumption in Federal facilities and operations. The FEMP office fulfills an important role in stimulating Federal agencies with non-energy missions to incorporate energy considerations into their planning and management functions and to improve energy efficiencies in their operations and facilities.

FEMP activities planned for FY 1982 are listed below:

- Maintain and update Federal-wide energy management plans;
- Update the DOE developed life-cycle costing methodology and procedures to include the use of marginal or replacement energy prices in life-cycle cost analysis for all Federal energy investments, and develop energy efficiency targets for existing Federal buildings;
- Evaluate program and agency performance, and develop criteria for a Federal energy management information system to support Federal policy decisions and Office program planning and evaluation activities; and
- Prepare detailed program progress and energy use reports to the President and Congress including quantifiable measures of accomplishements, problems and recommended changes to Federal plans.

Department of Energy
FY 1982 Congressional Budget Request
Key Activity Summary
Federal Energy Management Program

Key Activity	FY 1981 Activity	FY 1982 Activity
Federal Planning	Develop Overall Energy Management Plan for Federal buildings and operations.	Complete the Overall Energy Management Plan.
Program Technical Guidance	Initiate the development of buildings energy use targets and the update of Federal life cycle costing methodology to reflect current energy prices.	Complete development of buildings efficiency targets and update life cycle cost guidelines to include marginal prices of energy.
Program Performance Evaluation	Evaluate and approve 20 Federal agency buildings plans and 69 operations plans. Monitor all agencies progress and performance.	Evaluate and approve updates to 20 Federal agency buildings plans and 69 operations plans. Monitor all agencies progress and performance.
DOE Reporting	Prepare annual EO-12003, EPCA and NEPCA reports on progress, measures of accomplishments and problems for Congress and the President.	Prepare annual EO-12003, EPCA and NEPCA reports on measures of accomplishments and problems for Congress and the President.

Objectives and Federal Role

This program seeks to increase the use of energy from municipal waste as a cost-effective replacement for scarce and expensive fossil fuels. The goals of the program are:

- to accelerate the research and development of energy from waste technologies

- to integrate energy recovery systems and materials recovery systems. The removal of inorganics for recycling and energy conversion will enhance the operations and efficiency of most energy production facilities. The recycling of certain source-separated organics, such as used and overrun newsprint and cardboard, can displace significant quantities of energy.

- to develop more energy-efficient wastewater treatment processes for integration into the EPA clean water program and for retrofit in existing facilities, where it is economically feasible.

Consistent with the Administration energy policy articulated above, this program's emphasis also is on longer-term, high risk research and development that the private sector is unwilling to undertake on its own as the orderly termination of other projects whose continuation is inconsistent with this policy.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

Energy Conservation
Energy from Municipal Waste/Urban Waste
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Energy from Municipal Waste (CS)				
Operating Expenses:				
Technology Research and Development (Urban Waste)	$ 13,000	$ 10,100	$ 10,100	$ 9,000
Capital Equipment:				
Urban Waste	$ 0	$ 800	$ 800	$ 100
Total, Urban Waste Program	$ 13,000	$ 10,900	$ 10,900	$ 9,100

Authorization: Federal Nonnuclear Energy Research and Development Act of 1974 (P.L. 93-577), as amended.

Urban Waste	$10,900	$10,900	$9,100

The FY 1982 request to carry out this program is $9,100,000. A $9,000,000 portion of the request is for completion of, or followups to, projects and studies initiated in prior-years funded from operating expenses. The balance is related to capital equipment requirements.

A total of $7,000,000 will support the orderly termination of R&D programs in technical and institutional areas for the production of energy, the recovery and reuse of materials and energy, the conservation of energy in municipal waste functions, and the support of technology development with private sector partners.

The FY 1982 request will permit the completion of funding of current, long-term RD&D projects. Monitoring costs also will be accommodated.

In FY 1982, research and development will focus on completing unit improvements which have the potential to enhance efficiencies and economics. Special attention will be given to plan evaluation and the generation of engineering data. In future years, any further urban waste research and development of this type will be undertaken by the private sector. Longer range, generic research on conservation that will provide a technology base for private sector efforts is continuing in the Energy Conservation and Utilization Technologies Program in the Multi-Sector account.

Two million dollars of this request will be used to review and evaluate the need for any long range, generic research in support of district heating. Presently there is a lack of available data on whether advanced technologies can have significant potential for energy conservation when applied to district heating projects. This program will develop basic technical data on advanced technologies to serve as a basis for deciding whether there is long-term, high risk R&D that could justify Federal support.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

Key Activity Summary
Urban Waste Subprogram

Key Activities	Estimated Activities During FY 1981	Planned Actitivies During FY 1982
New Municipal Waste-to-Energy Recovery Technologies	o Prepare new contract packages for which contracting action was not completed in FY 80 - Completed by 3/81 o Evaluate approximately 50 unsolicited proposals - Completed by 9/81	o Continue ongoing management of R&D projects
Existing Municipal Waste-to-Energy Recovery Technologies	o Complete development report of large scale calorimeter - 9/30/81 o Phase I report of RDF preparation and combustion specifications - 8/31/81 o Complete evaluation report of Trommel Screens - 9/30/81 o Complete construction of ANFLOW pilot plant 2/28/81	o Demonstration of near-term technologies and systems - application and selection-9/30/82 o Alternative Fuels Program - Monitoring of Selected Proposals o Report on RDF preparation and combustion specifications 6/30/82
	o Phase I report of Institutional Plan for Implementing Resource Recovery - 8/31/81 o Report on Strategy and Plan for Demonstration of Energy from MSW technologies 8/31/81 o Alternative Fuels Program - Second Solicitation Technical evaluation	o Report on Institutional Plan for Implementing Resource Recovery - 6/80/82 o Begin limited Phase II operation of Ref COM proof-of-concept plant o Phase I Report on ANFLOW 50,000 gpd pilot plant

Program Direction	$6,430	$6,430	$3,100

A total of $3,100,000 is required to support staffing for the FY 1982 Buildings and Community Systems Program. This funding will support 72 full-time positions and an estimated 97 staff years of effort in FY 1982.

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PROGRAM OVERVIEW
INDUSTRIAL ENERGY CONSERVATION

There is clear evidence that the Nation's industrial sector is conserving energy. To present one example, the U.S. steel industry consumed 47 million BTU's per ton of finished steel in 1950. In 1973, the comparable figure was 35 million BTU's per ton--a 25 percent improvement in spite of the era's inexpensive energy. With the sharply rising energy prices of the 1970's, energy conservation by industry has accelerated. Between 1972 and 1976, improvements in composite industrial energy efficiency averaged 9.7 percent. Present industrial energy consumption is at almost the same level as in 1972, despite a 20 percent increase in real industry output. Decontrol of oil prices as a result of the President's January 28th announcement and increasing natural gas prices permitted under the Natural Gas Policy Act of 1978 will increase further the rate at which the industrial sector improves its energy efficiency. Conservation investment tax credits for such devices as recuperators and preheaters will also stimulate industrial conservation improvements. Accelerated depreciation allowances and the removal of unnecessary regulatory burdens, proposed as part of the President's economic recovery package, will improve industry's capital formation and provide the necessary means for high priority conservation investments.

Under these conditions, it is no longer necessary to have a Federal program of research, development, and demonstration on industrial energy conservation. While a government spending program might have made sense when energy prices were low and artificially controlled and energy conservation an unfamiliar idea, it is clear that this situation no longer exists today. The private sector on its own can, and will, develop and adopt new industrial conservation technologies in response to market forces. Therefore, continuation of the Industrial Conservation program would be a significant waste of tax dollars, so this program is proposed for termination in FY 1982. Longer term, generic research on conservation that the private sector is unwilling to undertake will continue in the Energy Conversion and Utilization Technology Program in the Multi-Sector account.

Energy Conservation
Conservation
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Revised Request
Industrial Energy Conservation (CS)				
Waste Energy Reduction:				
Operating expenses	$16,450	$24,800	$24,000	$ 0
Capital equipment	0	0	0	0
Subtotal	$16,450	$24,800	$24,000	$ 0
Industrial Process Efficiency:				
Operating expenses	$20,675	$36,000	$36,800	$ 0
Capital equipment	0	1,000	1,000	0
Subtotal	$20,675	$37,800	$37,000	$ 0
Industrial Cogeneration:				
Operating expenses	$10,750	$16,500	$16,500	$ 0
Capital equipment	500	0	0	0
Subtotal	$11,250	$16,500	$16,500	$ 0
Implementation and Deployment:				
Operating expense	$ 9,800	$ 7,500	$ 7,500	$ 0
Subtotal	$ 9,800	$ 7,500	$ 7,500	$ 0
Program Direction	$ 2,067	$ 3,100	$ 3,100	$ 965
Total, operating expenses	$59,742	$88,700	$88,700	$ 965
Total, capital equipment	$ 500	$ 1,000	$ 1,000	$ 0
Total, Industrial Energy Conservation	$60,242*	$89,700*	$89,700	$ 965

*A rescission of $46,700,000 included in this total is requested.

Authorization: Energy Policy and Conservation Act PL 94-163, Title III, Part D
National Energy Conservation Policy Act PL 95-619, Title IV, Parts 3 and 4 and Title VI, Parts 1 and 5
Non-Nuclear R&D Act PL 93-577
Energy Reorganization Act PL 93-438
Department of Energy Organization Act PL 95-91
Energy Security Act, PL 96-294, Title V, Subtitle G, Section 591

SUMMARY OF CHANGES

FY 1981 Appropriation Enacted	$89,700
Built-In Increases and Decreases:	
FY 1982 Base	$89,700
Program Increases and Decreases:	
Terminate Program	-$86,600
Program Direction (-$2,135)	-$ 2,135
FY 1982 Budget Request	$ 965

In FY 1982 all projects will be closed out in the following activities:

- Waste Energy Reduction
- Industrial Process Efficiency
- Industrial Cogeneration
- Implementation and Deployment

Program Direction.....$3,100 $3,100 $965

The FY 1982 budget request is $965,000. This represents a staff level of 30 full-time equivalent staff years necessary to moniter the orderly completion of projects funded in prior years.

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Energy Conservation
Transportation
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1980 Appropriation	FY 1981* Appropriation	FY 1982 Base	FY 1982 Request
Transportation				
Vehicle propulsion technology development:				
Operating expenses	59,500	67,400	67,400	11,000
Capital equipment	1,000	500	500	...
Subtotal	60,500	67,900	67,900	11,000
Electric and hybrid vehicle RDT&E:				
Operating expenses	38,000	36,820	36,820	19,600
Subtotal	38,000	36,820	36,820	19,600
Transportation systems utilization:				
Operating expenses	6,700	6,700	6,700	1,000
Subtotal	6,700	6,700	6,700	1,000
Alternative fuels utilization:				
Operating expenses	5,200	4,300	4,300	5,150
Capital equipment	100	1,000	1,000	250
Subtotal	5,300	5,300	5,300	5,400
Total				
Operating expenses	109,400	115,220	115,220	36,750
Capital equipment	1,100	1,500	1,500	250
Program direction	2,923	3,000	3,000	1,280
Transportation	113,423	119,720	119,720	38,280
FY 1981 Pay Cost Adjustment	0	- 70	- 70	0
Total	113,423	119,650	119,650	38,280

*Does not reflect a $38,650,000 rescission which is proposed for FY 1981 and is addressed in separate summary tables.

Authorization: P.L. 93-577, "Federal Nonnuclear Energy Research and Development Act of 1974"
P.L. 93-275, "Federal Energy Administration Act of 1974"
P.L. 93-438, "Energy Reorganization Act of 1974"
P.L. 94-163, "Energy Policy and Conservation Act"
P.L. 94-413, "Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976"
P.L. 95-91, "Department of Energy Organization Act"
P.L. 95-238, "Department of Energy Authorizations for FY 1978"

Summary of Changes

FY 1981 Appropriation enacted	$119,650
Program increases and decreases:	
Vehicle propulsion technology development	
Gas turbine (3) and Stirling engine (1) development projects are proposed for termination	- 43,800
Ceramic material development and testing	- 3,900
Component development for gas turbines and Stirling engines	- 3,610
Gas turbine and Stirling engine commercialization activities are proposed for termination	- 1,190
Vehicle tests and demonstrations are proposed for termination	- 3,000
Heavy duty vehicle waste energy recovery project	+ 100
Propulsion subsystems technology development and evaluation are proposed for termination	- 1,500
Electric and hybrid vehicle RDT&E	
Demonstration vehicles are proposed for termination	- 4,280

Program increases and decreases (continued)

Electric and hybrid vehicle RDT&E (continued)		
Loan default fund is proposed for termination	-	1,350
Vehicle evaluation effort	-	1,197
Electric vehicle and component R&D	-	5,401
Hybrid vehicle and component R&D	-	3,761
Advanced vehicle and fuel cell R&D	+	69
Program support	-	1,300
Transportation systems utilization		
Fuel economy information activities are proposed for termination	-	300
Driver awareness activities are proposed for termination	-	900
New concepts evaluations are proposed for termination	-	300
Freight and intercity passenger are proposed for termination	-	700
State and local technical assistance is proposed for termination	-	800
Nonhighway technology R&D is proposed for termination	-	1,000
Analysis and assessment are proposed for termination	-	1,700
Alternative fuels utilization		
Alcohol blends reliability fleet tests	-	650
Development of straight alcohol fueled vehicles	-	1,500
Engineering fleet tests using available hydrocarbons	+	650
Process special synfuels tests compositions	+	1,600
Program direction	-	1,650
FY 1982 Budget Request	$	38,280

Budget request: The Office of Transportation Programs' FY 1982 budget request for operating expenses, capital equipment and program direction is $38,280,000. This amount is required to carry out the program's objectives, which are to:

- Research and develop advanced engine components to provide high-risk, long-term, energy-efficient technological options for the automotive and truck industry.
- Research and develop advanced electric and hybrid vehicle systems, components and subsystems to improve vehicle performance, reliability, cost and acceptability.
- Provide comparative automobile fuel economy information to encourage the purchase of more fuel-efficient vehicles.
- Develop means of using alternative fuels in vehicles from the standpoint of resource/fuel/engine systems optimization to encourage the use of such fuels.

The budget request includes funding for multi-program, crosscutting activities such as policy, planning, evaluation and budget.

General: The Federal approach to transportation energy conservation has been refocused to make greater use of market forces. Decontrol of crude oil prices has removed the subsidy to oil usage that will allow transportation conservation to reach its true potential. This stimulus should, for example, increase the demand for small, fuel-efficient cars, thereby causing manufacturers to increase their production of fuel-efficient cars to meet this demand. Continuation of transportation conservation tax credits (e.g., excise tax exemptions for buses) is expected to lessen taxes of businesses by $300 million by the end of FY 1986, providing additional stimulus to conservation above and beyond rising fuel prices. Evidence is clear that consumers will respond to market forces by conserving energy in the transportation sector. Vehicle use of petroleum has dropped by 1.1 MBPD since 1978, due primarily to higher gasoline prices that led to greater use of more fuel-efficient automobiles. As another example, average annual fuel consumption per car declined 12.9 percent from 1973 to 1979.

In this new, healthier environment for conservation, it is possible to shift DOE's transportation conservation programs away from costly near-term development, demonstration, and commercialization activities, since these activities will be undertaken by the private sector in response to normal market forces. For example, General Motors has announced its intention to manufacture electric cars by the mid 1980's and has set up an electric

car "project center" to undertake research in this area. The DOE transportation program will continue to support long-term, high-risk, but potentially high-payoff, research and development on promising conservation technologies that are unlikely to be undertaken by the private sector alone. Examples of these are: (1) the structural ceramics needed to increase the thermal efficiency of heat engines; (2) advanced concepts for electric and hybrid cars, such as fuel cells; and (3) the exploration of gross tradeoffs between synfuel compositions and engine fuel tolerance to optimize engine plus fuel total design. These investigations will be pursued with guidance and cooperation from industry.

Vehicle Propulsion Technology Development	$67,900	$67,900	$11,000

Research and development (R&D) efforts are presently underway to advance the development and accelerate industry acceptance of energy-efficient and socially-acceptable advanced propulsion systems for highway use. Automobiles are becoming more efficient as a result of the industry's commitment to provide a competitive, fuel-efficient product in the marketplace. As fuel prices rise, an increased stimulus is present for the major U.S. automakers to continue this trend and incorporate propulsion systems of increasingly advanced design and sophistication. Transitions to revoluntionary automotive technologies and engine concepts are still of sufficient risk and long-term payback to warrant a supplementary Federal activity in supportive technology. Recognizing these recent trends in the industry, the FY 1982 Vehicle Propulsion activity is designed to underwrite, in the most cost-effective manner, many of these high-risk activities. This can only be done with the industry as a technological partner and only in a supplementary rather than duplicative manner. Technology related to advanced heat engines, i.e., gas turbines and Stirling engines, warrants this type of support.

Heavy duty trucks and buses are projected to become larger consumers of the total highway fuel as we move into the mid 1980's and early 1990's. Most projections indicate that trucks will be consuming more fuel than automobiles by the mid 1990's. The technological improvements in propulsion systems for trucks can reduce this consumption by as much as 20 percent in the 1990's but the stimulus of Federal support is needed to underwrite certain necessary high-risk elements of technological change. The Vehicle Propulsion activity in FY 1982 has also been designed to anticipate these trends and provide realistic long-term, high-risk technology development to improve truck and bus energy efficiency.

The Vehicle Propulsion Technology Development program will concentrate its activities in generic forms of technology in two major areas in FY 1982: (1) technologies related to advancing the state of technology in automotive propulsion systems, and (2) technologies related to improving energy efficiency in truck and bus systems.

Automotive Technologies

Since FY 1980 the Vehicle Propulsion program has been involved in advanced automotive gas turbine (AGT) engine development programs with two automotive industry teams. As a result of the initial designs and early component development and rig tests associated with the first generation of AGT, key technological barriers have been identified. These barriers are high-risk and must be solved if industry is to use this engine type in automotive propulsion as a substitute for the piston engine. The FY 1982 gas turbine program will change into a high-risk, technology advancement project in a number of key areas: (1) ceramics development and nondestructive testing techniques, (2) ceramic material characterization, (3) combustion efficiency improvement and alternative fuel-burning capability, and (4) compressor and power turbine aerodynamic advancement. Component tests will constitute the basis for advancements of these long-term technologies.

In the area of Stirling technology, the MOD I build was completed in the beginning of FY 1981 and is providing a new technological baseline for automotive Stirling engines. This baseline will be used to identify key technological areas that will be followed in FY 1982. Technological advancements, required to provide the automotive industry with data to judge this technology relative to their projected product lines, will be continued in at least the following: (1) low cost regenerator designs, (2) strategic material substitution in low-permeability metals, (3) advanced control systems, (4) ceramic heat-exchanger components, and (5) low-weight design techniques. The FY 1982 request will be a more generic high-risk, long-range research and technology program in the Stirling area focusing on these key areas.

Truck and Bus Related Technology Development

Most of the large industrial firms dealing with heavy duty transportation production agree that further, more long-range research and development can continue to improve efficiency in this sector. The FY 1982 request will allow long-term technology advancement to continue in the areas of: (1) waste heat utilization development, (2) advanced turbocompound engine component development, (3) ceramic insulation and critical pressure part characterization and development, and (4) fluid characterization for organic Rankine bottoming cycles. New areas of technology advancement will continue to be sought from industry in: (1) use of microprocessors for fuel management and engine/transmission shift logic, (2) more advanced fuel-insensitive heavy-duty diesel technology, and (3) other energy-efficient truck system improvements. The objective of any truck-related projects undertaken will be long range and high risk in nature; supplementary rather than duplicative of activities of the heavy-duty transportation industry.

KEY ACTIVITY SUMMARY - VEHICLE PROPULSION TECHNOLOGY DEVELOPMENT

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
I Automotive Technologies		
o Engine Development		
- 3 teams (turbine) DDA/Pontiac Garrett/Ford Chrysler/Williams	DDA/Pontiac team starts rig testing of ceramic structure, aerodynamics and other first design components near completion. Begin phasedown.	Perform generic research in support of automotive turbines under new contracts.
	Garrett/Ford team starts testing of MOD I, build 1 metal engine with ceramic regenerator. Begin phasedown.	
	Chrysler/Williams team completes engine design activity with first engine component review. Begin phasedown.	
- 1 team (Stirling)	Complete manufacture and delivery of 1st engines in MOD I build.	Perform research in support of automotive Stirling research under new contract agreements in: - materials - seals - control systems - heat exchangers.
	Continue computer code development in U.S.	
	Initiate engine dynamometer characterization.	
o Ceramics Application	Engine testing with ceramic bladed turbine wheel, ceramic regenerator, nozzle/shroud, and plenum at 2070°F.	Continue ceramics research, refocusing on more generic applications of turbine, Stirling and other engine parts.
	Complete design activity on 2265°F engine.	

KEY ACTIVITY SUMMARY - VEHICLE PROPULSION TECHNOLOGY DEVELOPMENT
(continued)

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
II Truck Technologies		
o Waste Heat Utilization		
- Organic Rankine Bottoming Cycle	Add 2nd test vehicle.	Design and integrate digital control system.
	Continue engine dynamometer tests for hardware verification and MOD data.	Evaluate alternative organic working fluids.
- Turbocompound Diesel Engine	Complete design of improved turbomachinery components.	Perform detail advanced component hardware design.
	Perform analysis on downsizing technology for low-horsepower engines.	Test improved components on engine dynamometer.
o Materials Development		Evaluate the use of ceramic components in heavy-duty diesel application and perform general tests on material characterization.
o Other Technologies		Investigate generic areas of technology that warrant Federal support. Fuel programming.

Electric and Hybrid Vehicle RDT&E $36,820 $36,820 $19,600

Electric Vehicle R&D: One of the major barriers to the commitment by industry to develop and produce electric vehicles is the commercial availability of batteries specifically designed for vehicle propulsion. The desirable attributes of an electric vehicle battery include reduced cost, high power density for vehicle acceleration, increased energy density for greater range and improved cycle life for repeated deep discharging and recharging. In FY 1981, research and development of several battery candidates was continued with nine industrial firms under cost shared contracts for nickel-zinc, nickel-iron, lead-acid and zinc-chlorine. The battery research and development effort is concentrating on the specific attributes necessary to assure compatibility with the total vehicle system. Test modules and full vehicle size experimental batteries are being delivered for comprehensive laboratory tests as well as in-vehicle engineering tests. In FY 1982, the program will concentrate on the most promising candidates determined from the laboratory and vehicle testing.

Advanced traction motors, controllers, complete propulsion subsystems and charger/state-of-charge indicators research and development is continuing in FY 1981. These components and subsystems are capable of higher efficiency, lower weight and lower cost that will significantly improve the performance and cost of electric vehicles. In FY 1982 the R&D will emphasize complete dc and ac propulsion subsystems and the related controllers.

Hybrid Vehicle R&D: The objectives of this long-term, high-risk effort is to help the private sector develop the technologies of cost-competitive hybrid vehicles with performance comparable to conventional vehicles. In FY 1981, the design and fabrication of a parallel hybrid was initiated with an advanced quick start fuel injected spark ignition engine, separately excited traction motor, advanced lead-acid batteries and a microcomputer control. Savings of from 40 to 70 percent of the fuel used by conventional ICE vehicles are possible with this hybrid design. In FY 1982, the fabrication of this hybrid research vehicle will be completed. In FY 1981, design studies of three advanced hybrid propulsion systems using Stirling, rotary heat engines and advanced batteries were completed. Development of a test procedure for hybrid vehicles is underway in cooperation with EPA and DOT for emission and fuel economy standards. In FY 1982, these test procedures will be promulgated for the Corporate Average Fuel Economy standards.

Advanced Vehicle R&D: The objective of this effort is to develop advanced technology suitable for a competitive general-purpose electric or hybrid vehicle using advanced technology for the 1990's. In FY 1981, the ETV-2, an electric vehicle with an advanced technology flywheel and propulsion system, began extensive laboratory and engineering road testing that will be completed in FY 1982. A comprehensive evaluation and cost/design study of advanced technology candidates for EHVs was initiated in FY 1981. In FY 1982, the research and evaluation of fuel cells for potential automotive use will be continued and expanded.

Testing and Evaluation: This program provides a unique opportunity to conduct engineering field tests in a controlled road test operational environment of advanced technology developed by the program's R&D activities. In FY 1981 and continuing in FY 1982 a limited number of experimental zinc-chlorine and nickel-iron batteries will be installed and tested in EVs in road test operations that will obtain comparitive data with lead-acid EVs and conventional vehicles. Experimental prototype transitor controllers on a limited number of vehicles will also be tested and evaluated in the demonstration operations. This energy-efficient controller has the potential of increasing the range of an EV by 20 percent. To increase battery reliability, battery system maintenance and failure/mode diagnostic techniques are being developed and evaluated in the fleet test operations. In FY 1982 battery systems and environmental controls will be developed to reduce the impact of cold ambient temperature on the range of electric vehicles. In FY 1981, performance and safety testing will be conducted on six different electric vehicles to verify the manufacturers' self-certification to the DOE performance and safety standards.

In FY 1982, the testing and evaluation effort will concentrate on the gathering and analysis of data from the operations of the demonstration vehicles. Wherever vehicles or system problems occur in the field, research and development will be initiated to address and resolve those problems.

KEY ACTIVITY SUMMARY - ELECTRIC AND HYBRID VEHICLE RDT&E

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
Electric Vehicle Research and Development	Modules and complete vehicle sets of experimental batteries delivered to National Battery Testing Laboratory for test and evaluation.	Comprehensive laboratory and in-vehicle engineering tests of selected batteries.
	R&D with 9 contractors on nickel-zinc, nickel-iron, lead-acid, and zinc-chlorine batteries for electric vehicle applications.	R&D emphasis on most promising candidates of battery types.
	Development of advanced traction motors, controllers, propulsion subsystems and charger/state-of-charge indicators.	Development of complete dc and ac propulsion subsystems and controllers.

KEY ACTIVITY SUMMARY - ELECTRIC AND HYBRID VEHICLE RDT&E
(continued)

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
Hybrid Vehicle Research and Development	Continue development of hybrid integrated test vehicle, develop standard test procedures for hybrid vehicle emissions and fuel economy; design studies of 3 advanced propulsion systems.	Fabrication completed of the hybrid research vehicle. Promulgate hybrid test procedure for inclusion in CAFE.
Advanced Vehicle Research and Development	Complete test and evaluation of ETV-2 vehicle. Continue Phase I dynamic test of inductive coupling of electrified roadway. Initiate cost/design study of advanced technology EHV candidates.	Complete inductive coupling dynamic testing. Complete development plan for most promising advanced technologies. Expand R&D of fuel cells for automotive application.
Testing and Evaluation	Add 150 EVs and eight new sites to the 1145 vehicles committed to the demonstration test fleet at 94 sites.	Data gathering and analysis; problem identification for R&D.
	Verification testing of 6 EVs certified by manufacturers to meet performance and safety standards.	Continue engineering field tests of advanced technology batteries, controllers, and subsystems.
	Field testing of a limited number of vehicles equipped with experimental (zinc-chlorine and nickel-iron) batteries and advanced controllers.	Develop battery system environmental controls for cold ambient temperature operation.
	Develop battery maintenance and failure-mode diagnostic techniques.	

Transportation Systems Utilization	$6,700	$6,700	$1,000

The FY 1982 budget request reflects the philosophy that the groundwork established through previous Federal research and information programs, combined with the increased general interest in improving energy efficiency resulting from recent price rises, has created a situation in which greater reliance can and should be placed on the marketplace. Except for the publication of comparative fuel economy, which is developed and disseminated by the Federal Government in compliance with the authorities contained in the Energy Policy and Conservation Act of 1975 (P.L. 93-163), private enterprise will be relied upon to carry out the activities performed under this program during the Nation's recent period of transition to higher energy prices.

In FY 1982, the program will print and distribute approximately 12 million copies of the Gas Mileage Guide. In order to assure that Federal resources are used most efficiently, only copies of the First Edition of the Gas Mileage Guide will be shipped to every new car and light-duty truck dealer in the U.S. Additional copies will be mailed to dealers only upon receipt of requests for additional copies or requests from dealers who were

not included on the initial distribution list. This will reduce the expense associated with printing and distributing copies of the Second Edition of the Guide, which is normally mailed to all dealer showrooms in March and contains information on vehicles included in the First Edition plus additional cars certified by the Environmental Protection Agency between September and January of the model year. In previous years, many dealers were receiving supplies of the Second Edition before their initial supplies had been depleted.

KEY ACTIVITY SUMMARY - TRANSPORTATION SYSTEMS UTILIZATION

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
New Car Fuel Economy	Publish and distribute 2nd Edition 1981 Gas Mileage Guide.	Publish and distribute, only upon request, 2nd Edition 1982 Guide.
	Publish and distribute 1st Edition 1982 Gas Mileage Guide.	Publish and distribute 1st Edition 1983 Guide.

Alternative Fuels Utilization	$5,300	$5,300	$5,400

The Alternative Fuels Utilization program has the objective of achieving technical readiness of various finished-fuel/engine combinations appropriate to extending and eventually replacing petroleum as fuel for highway vehicles. The work also serves as the focus for the linkage to establishing industry agreement on finished fuel compositions which are otherwise hampered by antitrust barriers. The program establishes links involving direct funding between government, automotive and fuel industries, through which government resources can be used to accelerate end-use R&D in optimizing the resource/fuel/engine system. Research activities through FY 1981 have established the technical data base and delineated the more practicable options to overcome deficiencies. Engineering-type fleet tests on 14 vehicles representing the state of the art and operated on ethanol- and methanol-gasoline blends have been completed in FY 1981, leading to identification of formulated commercial-type fuels to be used in field reliability fleet tests on some 825 vehicles operating in a variety of climatic areas. This expands on completed tests on typical gasohol conducted for comparison. Test and demonstration activities on 10 experimental straight alcohol-fueled vehicles using several fuel preparation systems will be completed in FY 1981. Initial viability assessments of the use of methane in transportation were conducted in FY 1981.

The ongoing field reliability fleet tests in FY 1982 will concentrate on methanol/gasoline and/or methanol/ethanol/gasoline, depending on earlier investigative results. Straight alcohol fueled vehicles testing will continue as an activity of the Office of Alcohol Fuels. The 14-vehicle engineering fleet used for alcohol/gasoline tests will be used to test and analyze performance of several early, available hydrocarbon components from coal and oil shale processing. The applicability of petroleum specifications and tests to such fuels will be assessed. Initial exploratory test and evaluation contracts will continue toward determining gross tradeoffs between synfuels composition and engine fuel tolerance, so as to establish the basis for future optimal fuel/engine designs. The remainder of the budget ($1,600,000) will be used to process and make available to industry special synfuels tests compositions.

KEY ACTIVITY SUMMARY - ALTERNATIVE FUELS UTILIZATION

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
Alcohol/Gasoline Blends	Conducted field proof-of-performance fleet tests in various climatic/geographical areas on gasohol and a formulated ethanol/gasoline blend.	Complete ethanol/gasoline tests in field fleets, and conduct tests with methanol/gasoline blends and/or methanol/ethanol/gasoline blends.
Straight Alcohol	Provide technical support to DOT/UMTA and USPS on modified gasoline and diesel vehicles for experimental field operations.	Continue cooperative action as appropriate to the respective organizations.
Gasoline & Diesel-Like Synfuels; New Hydrocarbons		Test 14 vehicle fleets used with alcohol/gasoline blends for tests on early, available components from shale and coal, and assess applicability of petroleum-type specifications.
	Conduct exploratory tests and evaluation on tradeoffs between minimum fuel processing and new engine design.	Continue exploratory tests to establish initial approach to optimized fuel/engine design.
		Acquire available syncrude or partially processed liquids, process to meet established test fuel specifications and make available for industry-sponsored testing.

Program Direction	$2,930	$2,930	$1,280

The FY 1982 budget request represents a staff level of 31 full-time permanent (40 full-time equivalent) positions. The workload represented by the FY 1982 operating budget is achievable through redeployment of staff to most effectively and efficiently utilize available personnel by each subprogram. Program management, including key decision authority and overall program direction, will be the responsibility of program managers at DOE headquarters.

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Department of Energy

FY 1982 CONGRESSIONAL BUDGET REQUEST

Energy Conservation
Conservation
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 * Appropriation	FY 1982 Base	FY 1982 Request
State and Local (CS)				
Schools and Hospitals Grants Program:				
Operating expenses.....	$143,750	$181,250	$181,250	$100,000
Subtotal.....	143,750	181,250	181,250	100,000
Other Local Government Buildings Grant Program:				
Operating expenses.....	17,700	0	0	0
Subtotal.....	17,700	0	0	0
Weatherization Assistance Grant Program:				
Operating expenses.....	198,950	181,975	181,975	0
Subtotal.....	198,950	181,975	181,975	0
Energy Management Partnership Activities:				
Energy Policy and Conservation Grant Program:				
Operating expenses.....	37,800	37,800	37,800	0
Subtotal.....	37,800	37,800	37,800	0
Energy Conservation and Production Grant Program:				
Operating expenses.....	10,000	10,000	10,000	0
Subtotal.....	10,000	10,000	10,000	0
Energy Extension Service Program:				
Operating expenses.....	25,000	20,000	20,000	0
Subtotal.....	25,000	20,000	20,000	0
Emergency Energy Conservation Program:				
Operating expenses.....	1,500	12,000	12,000	2,000
Subtotal.....	1,500	12,000	12,000	2,000
Program Direction:				
Operating expenses.....	6,836	9,862	9,862	4,965
Subtotal.....	6,836	9,862	9,862	4,965
Total, State and Local.....	$441,536	$452,887	$452,887	$106,965

*Does not reflect a $116,925 rescission which is proposed for FY 1981.

Authorization: National Energy Extension Service Act, Title V, P.L. 95-39;
Energy Policy and Conservation Grant Program (Energy Policy and Conservation Act, P.L. 94-163);
Energy Conservation and Production Grant Program (Energy Conservation and Production Act, P.L. 94-385);
Schools and Hospitals Grant Program (National Energy Conservation Policy Act, Sec. 301-304, P.L. 95-619);
Other Local Government Buildings Grant Program (National Energy Conservation Policy Act, Sec. 310-312, P.L. 95-619);
Weatherization Assistance Program (Energy Conservation and Production Act, Sec. 411, P.L. 94-385);
Department of Energy Organization Act, P.L. 95-91;
Emergency Energy Conservation Act, Title II, P.L. 96-102.

Summary of Changes

FY 1981 Appropriation Enacted	$452,887
Program Decreases:	
State and Local Assistance Programs	
Termination of Programs (WAP, EPCA, ECPA, EES)	-249,775
Reduction of Schools and Hospitals Program	- 81,250
Reduction of Emergency Energy Conservation Program	- 10,000
Reduction in Program Direction	- 4,897
FY 1982 Budget Request	$106,965

Program Overview
State and Local Assistance Programs

Financial assistance to State and local government conservation programs will be reduced and restructured. Grants for State energy offices and public outreach programs will be eliminated. These programs have created new bureaucracies while doing little to promote conservation. Current public awareness of energy conservation benefits and the high level of private investment in energy conservation clearly show that these programs do not justify Federal support. Grants for conservation activities in public and non-profit schools and hospitals will continue at a reduced rate of approximately $100 million. These grants have proved their value in financing cost-effective conservation improvements in public facilities not eligible for tax incentives, but the overall fiscal retrenchment necessary for the success of the President's economic recovery program, among other factors, requires a reduction in program funding at this time.

Finally, the Energy Department's Weatherization assistance program will be incorporated into the Department of Housing and Urban Development's proposed community development support assistance program. Low-income home weatherization activities will thus continue, but more in accord with local needs and priorities. Currently, about one-third of community development block grant funds, or about $1 billion annually, is targeted by recipient communities to some form of rehabilitation. Combining the Department of Energy weatherization program with the community development block grant is one example of Administration efforts to shift resources and decisionmaking authority to State and local governments through block grants and program simplification wherever possible. The existing Department of Energy program has been plagued by increasing costs and quality control problems. As currently structured, the Department of Energy program would take 50-100 years to reach all the potentially eligible low-income households. By shifting administrative responsibility entirely to the local level, communities will be able to devise weatherization efforts most appropriate to their needs and circumstances and achieve greater levels of efficiency and productivity.

1. Schools and Hospitals Program

a. Program Overview

Public and non-profit schools and hospitals are large consumers of energy and, as such, face severe financial burdens with rising energy prices. Market forces are slow to affect this sector of the economy since most operating funds for public and non-profit schools and hospitals come from local, State and Federal tax revenues (property taxes, medicare, medicaid, etc.) and these institutions do not benefit from tax incentives. Historically, schools have experienced severe capital formation problems in undertaking projects of this nature. Hospitals generally have lacked the incentive to conserve energy since their operating costs, including energy costs, are passed through to third-party reimbursers such as medicare and medicaid. For example, a recent American Hospitals Association study found that energy costs accounted for over $1 billion of these reimbursement requests in 1979 alone. Assistance to non-profit schools and hospitals helps to mitigate the negative impact of higher fuel prices and provides incentives for them to undertake further energy conservation efforts on their own.

Authorized in 1978 by the National Energy Conservation Policy Act (NECPA), the Schools and Hospitals Program is designed to improve the energy efficiency of schools and hospitals.

The program is divided into two phases. In Phase I, DOE has provided grants to each State to conduct and/or administer a Statewide program of preliminary energy audits/energy audits (PEA's/EA's) in eligible buildings. The States conducted PEA's to make an estimate of number of eligible buildings, their energy using characteristics, and potential for energy conservation. EA's establish a "building profile" of each eligible facility (with respect to type, size, energy use level and energy using systems), identify changes in operations and maintenance procedures which would reduce energy consumption without significant capital expenditure, and provide initial assessments of the need for building retrofit measures.

In Phase II of the program, DOE is providing grants for energy conservation projects made up of technical assistance programs (TA) and implementation of energy conservation measures (ECM). To be eligible for a technical assistance program grant:

- o The facility must have had an acceptable EA conducted either under Phase I of this program or independently.

- o The energy saving operations and maintenance procedures recommended as a result of that audit must have been implemented.

- o Results of that audit must indicate that there is a high probability that retrofit of the building would be cost-effective

To be eligible for an energy conservation measure grant, the building must have had a technical assistance audit (detailed engineering analysis) which provides identification of all potential energy conservation measures appropriate to the building, and assesses their energy cost-effectiveness by analyzing the cost, energy savings and type of fuel saved of each measure. This data is subsequently used to rank applications for energy conservation measures.

Available and projected funds for grants for preliminary energy audits/energy audits, technical assistance and energy conservation measures for Fiscal Years 1979-1982 are as follows:

DISTRIBUTION OF FUNDING FOR ENERGY AUDITS, TECHNICAL ASSISTANCE ENERGY CONSERVATION MEASURES GRANTS AND CONTRACTS BY YEAR

Fiscal Year	PEA/EA	TA	ECM	Contracts	Total
1979	$20,000,000	-0-	-0-	$ 200,000	$ 20,200,000
1980	5,000,000	$56,625,000	$179,625,000	2,500,000	243,750,000
1981*	-0-	11,300,000	63,400,000	6,600,000	81,300,000
1982	-0-	13,800,000	78,200,000	8,000,000	100,000,000
Total	$25,000,000	$81,725,000	$321,225,000	$17,300,000	$445,250,000

b. Accomplishments

Significant accomplishments for the Schools and Hospitals Program in FY 1980 include:

- o State Plans were approved for all States and Territories, except Nevada, which is not participating.

- o Through FY 1980, 216 grants, totalling $23,680,000 were awarded to States for the conduct of preliminary energy audits and energy audits in schools and hospitals. In FY 1980, 309,114 buildings received preliminary energy audits and 50,765 have received energy audits. Sixteen (16) percent of the eligible schools and 25 percent of the eligible hospitals have received energy audits.

- o The energy audits identify measures which, if implemented, would be able to reduce the energy consumption of most buildings by an estimated seven to twenty percent.

- o Through FY 1980, 7,423 grants, totalling $216,829,000, were awarded (obligated) for technical assistance and energy conservation measures in 20,178 schools and hospitals. The estimated annual energy savings as a result of these grants is 10,700,000 barrels of oil equivalent.

* Reflects proposed FY 1981 rescission of funds.

Significant accomplishments targeted for the Schools and Hospitals program in FY 1981 include:

- o By the end of FY 1981, Schools and Hospitals program will have awarded grants totalling an additional $74,700,000 for technical assistance analyses and energy conservation measures in an estimated 6,800 additional buildings. The annual energy savings as a result of these grants is estimated to be 3,300,000 barrels of oil equivalent.

c. Budget Request

Schools and Hospitals Grant Program.....	$81,300 1/	$81,300	$100,000

The drastic fiscal retrenchment required by the President's Economic Recovery Plan will affect all areas of the Federal Budget, including this program. In support of the President's plan, funding for Schools and Hospitals is being stretched out by reducing the funding requested to approximately $100,000,000 per year.

The energy conservation program for Schools and Hospitals as established by Title III, Part A of the National Energy Conservation Policy Act (NECPA), authorized $900,000,000 for matching grants for conservation activities to States, public and non-profit schools and hospitals. Because of delayed NECPA enactment and the preparation needed to implement this complex program in FY 1979, the Department did not request grant funding for FY 1980. Instead, DOE requested a reappropriation of $141,250,000 from FY 1978 to be added to the carryover of $100,000,000 in FY 1979 appropriations. In FY 1980, $225,768,000 was obligated. For FY 1981, $81,300,000 is available and will be obligated by the close of the fiscal year.

The anticipated funding schedule is as follows:

Fiscal Year	Appropriation	Available for Obligation	Estimated Obligation
1979/80	$302,600,000 2/	$263,097,000 2/	$245,097,000
1981	181,250,000	98,977,300 1/	98,977,300
1982	100,000,000	100,000,000	100,000,000

Of the $100,000,000 requested for FY 1982, DOE intends to award $92,000,000 in grants to schools and hospitals. These grants will provide funds for technical assistance analyses and energy conservation measures in an estimated 8,400 buildings. The energy saved as a result of these grants is estimated to be 4,100,000 barrels of oil equivalent annually.

The additional $8,000,000 being requested will be used for necessary contractor support for auditing and monitoring grants, program evaluation, management information system support, technical review of grant applications and for the survey, evaluation and dissemination of effective energy conservation methodologies and energy management practices in institutional buildings. These activities will be disproportionately greater in FY 1982 since they will cover not only grants awarded in FY 1982, but also grants awarded at the end of FY 1981.

1/ Includes $17,677,300 unobligated carryover. A $99,950,000 proposed rescission of FY 1981 funds is subtracted from this amount.
2/ Actual appropriations were not available for obligation due to late authorization enactment and complicated rulemaking procedures.

Department of Energy
FY 1982 Congressional Budget Request

Key Activity Summary

Schools and Hospitals Program

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Assistance for retrofit of buildings	Provide financial and other assistance to 6,800 schools and hospital buildings	Provide financial and other assistance to 8,400 school and hospital buildings
	Review and update management procedures and monitoring plan	Review and update management procedures and monitoring plan
Evaluation	Design and implement evaluation	Complete evaluation

2. Weatherization Assistance Program

a. Program Overview

In FY 1982, the Energy Department's weatherization assistance program will be incorporated into the Department of Housing and Urban Development's proposed community development support assistance program. Low-income home weatherization activities will thus continue, but more in accord with local needs and priorities. Currently, about one-third of community development block grant funds, or about $1 billion annually, is targeted by recipient communities to some form of rehabilitation. Combining the Department of Energy weatherization program with the community development block grant is one example of Administration efforts to shift resources and decisionmaking authority to State and local governments through block grants and program simplification wherever possible. The existing program has been plagued by accountability and cost control problems. As currently structured, it would take 50-100 years to reach all the potentially eligible low-income households in the Nation. By shifting administrative responsibility entirely to the local level, communities will be able to devise weatherization efforts most appropriate to their needs and circumstances and achieve greater levels of efficiency and productivity.

b. Budget Request

Weatherization Assistance Grant Program.....	$175,000 1/	$175,000	$ 0

1/ Reflects proposed FY 1981 rescission of funds.

3. Energy Management Partnership Activities

a. Program Overview

Grants for State energy offices and public outreach programs will be eliminated. These programs have created new bureaucracies while doing little to promote conservation. Current public awareness of energy conservation benefits and the high level of private investment in energy conservation clearly show that these programs do not justify Federal support.

b. Budget Request

Energy Management Partnership Activities (EMPA) Component Programs (EPCA, ECPA, EES).....	$67,800	$67,800	$ 0

The component programs under EMPA, the Energy Extension Service and State Energy Conservation Programs, are proposed for termination in FY 1982.

4. Emergency Energy Conservation Programs

Budget Request	$ 2,000 1/	$ 2,000	$ 2,000

The FY 1982 request of $2,000,000 seeks to strengthen emergency preparedness activities. The requested level of support will be used in conjunction with market oriented measures being developed under the lead of the Office of Policy, Planning and Analysis. This will enable DOE to refine energy emergency contingency measures. It also will allow DOE to analyze emergency measures aimed at mitigating the adverse economic and social impacts of a major interruption.

5. Program Direction	$ 9,862	$ 9,862	$ 4,965

The FY 1982 budget request is $4,965,000 to support 155 full-time permanent positions.

The nature of the program thrust within the State and Local Assistance Programs area, primarily constituting grant administration with heavy technical assistance provision, imposes a high priority for personnel resources. The importance of fiscal integrity, funding accountability and positive cost-benefit operation, as well as successful technology transfer and information dissemination activities requires adequate numbers and distribution of staff.

The Headquarters staff is responsible for program administration and coordination. This includes the development of program policies, the development and publication of program regulations, and the development of administrative grant procedures and manuals. They also train Regional staff, respond to public and Congressional inquiries, direct program evaluation activities and manage support contracts.

The Regional staff is responsible for grants management (including application review and awards), data collection and reporting, contact and coordination with grantees, and technical assistance.

1/ Reflects proposed FY 1981 rescission of funds.

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Multi-Sector

The Multi-Sector budget request is composed of two major components: the Energy-Related Inventions Program and Energy Conversion and Utilization Technology. The request for Multi-Sector programs includes funding to support activities such as policy, planning, evaluation, budget and management.

The Energy-Related Inventions Program provides direct support to inventors by evaluating their inventions and by providing assistance to innovators with promising inventions in order to help develop their products or processes for commercialization.

The research and development activities comprising the Energy Conversion and Utilization Technology (ECUT) Program fill the important gap between the generic research conducted in the Basic Energy Sciences Program in the Office of Energy Research and the highly focused development activities in the end-use sectors of the Conservation program. The gap filled by ECUT covers basic and applied research through to exploratory and technological development. Further development beyond these phases is the responsibility of the DOE end-use sector offices working with industry and/or industry alone. In this unique role, the ECUT Program supports longer term problem-solving research and develops new technologies for increasing energy productivity.

The Appropriate Technology Small Grants Program was funded out of the Multi-Sector account in previous budgets. This program has been terminated in FY 1982, because these funds were spent primarily on near-term development, demonstration, and commercialization grants that can be undertaken by the private sector without Federal assistance.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST
Conservation
Energy Conservation - Operating Expenses
Energy Conservation - Plant & Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Adjusted Base	FY 1982 Request
Multi-Sector (CS)				
Appropriate Technology:				
Operating Expenses. . .$12,000		$12,000	$12,000	0
Invention Program				
Operating Expenses. 4,200		3,400[1]	5,800[1]	5,400
Energy Conversion and Utilization Technology:				
Operating Expenses. 0		8,000	8,000	11,700
Capital Equipment 0		0	0	400
Subtotal	0	8,000	8,000	12,100
Personnel Resources				
Operating Expenses. 635		700	700	190
TOTAL				
Operating Expenses				
Multi-Sector. $16,835		$24,100	$26,500	$17,690

1 The FY 1981 appropriation was $5.8 million for this program, of which $2.4 million was allocated for the evaluation of energy-related invention proposals by the National Bureau of Standards (NBS). However, prior to the FY 1982 request, funds for NBS activities and grants were justified in separate appropriate accounts, respectively, Departmental Administration and Energy Conservation.

FY 1982 Adjusted Base	
Inventions	$3,400
NBS Inventions	2,400
TOTAL	5,800
FY 1982 Request	5,400
Program Decrease	$ 400

Summary of Changes

FY 1981 Appropriation enacted	$26,500
Built-in increases and decreases:	-0-
FY 1982 Base	26,500
Program Increases and Decreases	
Increases:	
Energy Conversion Utilization Technology	+ 4,100
Decreases:	
Appropriate Technology (AT)	- 12,000
Inventors Direct Support	- 400
Program Direction	- 510
FY 1982 Budget Request	$17,690

Authorization: P.L. 93-577, Section 14, Federal Non-Nuclear Energy Research and Development Act of 1974. - Inventions.
P.L. 93-577, Federal Non-Nuclear Energy Research and Development Act of 1974. - ECUT.

Inventions Program: $3,400 $5,800 $5,400

The Energy-Related Inventions Program provides direct support to inventors by (1) evaluating their inventions (2) providing technical and financial assistance, and (3) assisting in the commercialization of those products or processes which contribute to energy conservation or production. Established by Section 14 of Public Law 93-577, this program pays particular attention to those inventions submitted by individual inventors and small companies. Inventions are evaluated by the National Bureau of Standards (NBS). The Department of Energy (DOE) considers for support those inventions recommended to them by NBS. The decision on the type and amount of support, if any, is based on the inventor's proposal for development, a review of this proposal by an appropriate DOE technical program, and the NBS recommendation.

In FY 1980, DOE awarded 22 grants. In Fiscal Year 1981, DOE plans to award 36 grants. In FY 1982, DOE plans to award 36 grants.

The FY 1982 program objectives will be accomplished through the development of an agreement with the Small Business Administration, similar to their existing memorandum of understanding with the National Aeronautics Space Administration (NASA). The agreement will provide inventors with technical and entrepreneurial guidance through the network of SBA field offices.

Through December 31, 1980, NBS has received 16,227 requests for evaluation, and completed action on 15,561 of these. Six hundred and sixty-six inventions are under consideration at NBS for possible recommendation to DOE. Historically, 1.3 percent of all inventions submitted to NBS for evaluation, are found to have sufficient merit to result in a recommendation for government (DOE) support. Presently, 204 inventions are under active consideration by NBS. One hundred and seventy requests have been recommended to DOE. The total amount awarded to date is $6,072,522, with 90 inventors receiving grant awards.

Inventions supported by DOE are now reaching the marketplace, and in many cases, achieving significant success. Three examples follow; in each case energy and economic benefits are substantial.

- Melvin H. Sachs, inventor of "U-Form Technology," received an $87,230 grant. The U-Form Technology uses rigid, lightweight aggregate insulation to provide the "form-works" for the concrete structural members of a building. Preformed panels make up the interior and exterior wall surfaces of the building when it is completed. The technique is estimated to cut construction time by one-third or more, and permits year-round workability of concrete without freezing. In one instance, Detroit Edison found the actual billings for total energy costs in a 120,000 square foot building in Livonia, Michigan (U-Form Headquarters) averaged only $\$0.63/ft^2$ for all energy consumed during 1978-79. This compares with Detroit Edison's own projection of $\$1.00$ to $\$1.25/ft^2$ for other thermally-efficient but more conventionally constructed buildings. Sponsorship by the Energy-Related

Inventions program was instrumental in U-Form receiving top honors in a competition for "significant achievement in technological development" at the Eighth Annual World Fair for Technology Exchange in Atlanta, February 1980, and is seen to be a significant factor in Mr. Sachs' increasingly successful marketing efforts.

- Michael Zinn, inventor of "Solaroll," was awarded a grant of $110,000. This invention is a low-cost, extruded-plastic solar collector, suitable for mass production. As a result of his participation in the Energy-Related Inventions Program, Mr. Zinn was able to negotiate a $500,000 loan from the Small Business Administration to enable him to equip his shop for higher production of the "Solaroll." With that loan and the grant from DOE to test and demonstrate the unit, Mr. Zinn has continued to expand his business. In 1980, his sales were projected to be $8 million, and he projects $16 million in 1981. He is in the process of negotiating foreign licensing agreements.

- Inventor Dan Ben Schmuel was awarded a $125,000 grant for a cooperative demonstration of his "Heat Extractor" at a facility of the Mohawk Paper Company. This device is a direct-contact heat exchanger that uses "waste" heat for heating water and has been installed at several hospitals and hotels. It has also been found very useful in certain process industries that require large amounts of hot water, such as paper mills. The number of employees at Heat-Extractor Corporation has increased from 20 to 150, and the company has a backlog of several million dollars of heat exchanger orders. Mr. Ben Schmuel states that the Energy-Related Inventions Program report "explained" the operation of the Heat Extractor, and was instrumental in allowing him to sell the device.

Department of Energy
FY 1982 Congressional Budget Request

Key Activity Summary

Inventions Support Division

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1981	PLANNED ACTIVITIES DURING FY 1982
Program Evaluation	Develop detailed eval. plan to measure NBS eval. phase of the program; collected survey data; data anal. & interpretation; documentation of efforts	Evaluate progress of funded inventors
Issue Grants	Issue about 36 grant awards to inventors recommended by the National Bureau of Standards (NBS)	Issue 36 grants
Conduct Regional Workshops for Inventors	Hold six Regional Workshops throughout the U.S. in cooperation with NBS to encourage inventing and to assist inventors in the development of their ideas from the planning to the commercialization stage	Hold Regional Workshops throughout the U.S.

Energy Conversion Technology $8,000 $8,000 $12,100

(Energy Conversion and Utilization Technologies)

The Energy Conversion and Utilization Technologies (ECUT) Program complements the other conservation research and development (R&D) programs by supporting basic and applied research and exploratory development of new concepts that offer increased efficiencies in energy conversion and utilization applications. The objectives of the ECUT Program are to establish technical feasibility of advanced concepts in areas such as: combustion mechanisms, advanced catalysis, heat exchangers, and materials. Results from the work supported by the program will expand the technology base from which more efficient energy systems can be developed. The basic authorizations for this program are the Federal Nonnuclear Research and Development Act of 1974 (P.L. 93-577) and the enabling legislation for the Department of Energy (P.L. 95-91).

The ECUT Program is organized along matrix lines with one axis of the matrix designating the potential users of the new technologies: namely, the end-use private sectors. The other axis of the matrix covers the technology categories under the ECUT project areas. The following tabulation presents this matrix filled out for planned FY 1982 projects. The matrix organizational approach aids in ensuring that the program focus is on real technology needs, while at the same time facilitating the generic application of the new technologies to other end-use sectors that would not normally be aware of the newly emerging technologies. As shown in the matrix, work elements are planned for FY 1982 primarily in the private sectors of buildings, industry, and transportation.

There is a category of ECUT activity designated as New Concepts. There are no projects shown for this sector because current planning calls for a maximum of 10% of the funding request to be made available for exploring high-risk, long-term, high-potential payoff unsolicited proposals. These funds will be applied where the unsolicited concepts appear to offer significant improvement in energy productivity compared to conventional approaches.

PROGRAM GOALS

Setting of preliminary and broad goals has been made for the program on an end-use sector technology basis. The goals are presented as follows:

Buildings and Community Systems Technologies (Private Sector)

- o Explore advanced closed-cycle power systems concepts for ultimate develoment and application by industry to thermally activated heat pumps and total energy systems.
- o Conduct research on advanced building heating concepts aimed at improved system efficiency and multifuel capabilty.
- o Explore new building insulation materials aimed at double the effectiveness of conventional materials.

Industrial Technologies (Private Sector)

- o Explore advanced open-cycle and closed-cycle power systems for industrial cogeneration applications.
- o Investigate advanced industrial furnace concepts with improved efficiency and multifuel capability.
- o Develop improved industrial heat exchanger materials to improve process efficiency and increase utilization of rejected heat.
- o Develop improved technologies for materials separation processes to reduce energy consumption in distillation and other separations by 25%.

- o Develop advanced chemical processes to reduce energy consumption by 50% as well as the dependence of the chemical industry on high-cost petroleum-derived feedstocks.

Transportation Technologies (Private Sector)

- o Broaden the knowledge base for industry development of improved versions of internal combustion engines such as stratified charge, lean homogeneous charge, and adiabatic diesel engine cycles with the ultimate goal of improving automotive efficiency by 20 to 30%.

- o Conduct research on improved lubricants for high-temperature engine applications.

Waste and Biomass Utilization Technologies (Private Sector)

- o Advance the technologies related to biological conversion of waste and biomass to alternative fuels.

Utilities Technologies (Private Sector)

- o Develop effective, cost-competitive heat exchanger materials for recovery of heat rejected in the operation of decentralized electric power generating systems.

PLANNED ACTIVITIES IN FY 1982

The current planned agenda of activities in the ECUT Program for FY 1982, based on present status planning activities, is summarized in subsequent paragraphs. The material is summarized by end-use technologies.

Buildings and Community Systems Technologies (Private Sector)

During FY 1982 research and exploratory development of advanced Rankine and Brayton cycles (or variations of these cycles) for heat engines and heat pumps will begin. These devices could possibly provide more efficient building heating and cooling.

Research on improved urethane foam insulation and membrane materials for buildings is planned to reduce heat losses and the energy required for cooling.

Transportation Technologies (Private Sector)

The engines studied in the Engine Combustion Technology project all have the potential to provide increased efficiency, and some show promise of being adaptable to a much broader range of fuels. Because they are more sensitive to design details than conventional engines, all face difficult emissions control and design optimization problems. An effective compromise between efficiency emissions, and fuel flexibility will require deeper understanding and better ability to control the many physical processes that occur within an engine.

A proven set of analysis and measurement techniques to permit engine designers to understand the performance of engines using alternative fuels has been developed. The technologies employed include laser-based measurement techniques and large-scale multidimensional computer solutions to the physical and chemical equations that describe the fluid mechanics and combustion chemistry of engine operation. The engine types under continuing study are the conventional homogeneous charge, light-duty diesel, and direct-injection stratified-charge (DISC) engines.

An important part of this work is the cooperative relationship that has been developed with private industry. Research groups studying homogeneous charge engines, light-duty diesels, and DISC engines include both DOE-sponsored and motor industry researchers, who work together to identify the key issues, to guide the DOE work toward solution of those issues, and to assure that results are made available to private industry. It is planned to continue and expand cooperative efforts in all of the above areas during FY 1982.

Work on materials research affecting the private sector transportation area will continue to seek to develop new or improved materials such as high-temperature alloys, structural ceramics, and light weight high strength materials, which would permit other developments leading to more efficient transportation energy use.

Specific materials R&D scheduled for effort during FY 1982 include:

- o structural ceramics, long-range ductile ordered alloys
- o small adiabatic diesel engine components

Industrial Technologies (Private Sector)

The direct heating and conversion systems work to be carried on in FY 1982 supports the development of new technologies that can improve the performance and fuel flexibility of furnaces, boilers, and advanced direct energy conversion systems, such as thermionic, thermoelectric and ferromagnetic devices. Research efforts planned will focus on: (1) fuel dependent combustor design capability for furnaces and boilers, (2) development of of advanced concepts in uses for "dirty" fuels, and (3) cogeneration, including waste heat utilization.

Planned research into physical processes seeks a greater understanding of processes (heat transfer, grinding, etc.) that occur in energy-using components and systems. The resulting knowledge will be used to improve efficiency in advanced energy-using systems.

Selected activities from the DOE Fossil Energy heat exchanger program have been transferred to the ECUT program and will be continued. These activities include comparison of various designs for more efficient heat exchanger surfaces, an evaluation of various coatings that prevent corrosion in severe exhaust gas environments, and development of an experimentally validated, computerized heat exchanger network optimization technique for industrial processes.

Closed-cycle power systems work supports the future development of closed-cycle power systems that are more fuel efficient and that can use alternative fuels. The closed-cycle power systems R&D task was initiated in FY 1981, and major effects are being directed toward completion of the technology needs assessment for Stirling engine technology. Results will be documentated and an appropriate research agenda will be prepared. FY 1982 activities will establish research priorities for critical components of kinematic as well as free-piston Stirling engine designs.

Applied research and exploratory development activities in the chemical processes category will promote use of more efficient chemical reaction paths, use of noncritical materials, and diminution of waste streams. This effort began in FY 1981 with the prepartion of a research agenda dealing with the technology of catalysis, biocatalysis, electrochemcial processes, and engineering process design and modeling. Future planned activities include:

- o feasibility demonstrations in olefin conversion by homogeneous catalysis; energy-efficient processes for nitrogen fixation; and CO/H_2 (syngas) reactions at moderate temperatures and pressures
- o development of a generalized catalysis design tool based on molecular modeling
- o development of design and diagnostic tools for improved electrochemical cells for metal production and for electrodeposition processes
- o definition of concepts for the development of photoelectrodeposition processes
- o identification of biocatalytic processes suitable for engineering development in the next 10 years.

ACCOMPLISHMENTS

Since the start of the program in FY 1981, measureable progress has been made in several areas. These include completion of program plans and advancement of the technology base in pertinent technical areas relating to energy conversion and its end-use. The intensive planning activities initiated in FY 1981 resulted in a research agenda of important technologies and technical problems covering all end-use sectors of the economy. A technical review of the research agenda by industrial groups will be completed in FY 1981. The review and recommendations of private industry will be used to focus our technical objectives on the pacing problems that must be solved before more energy-efficient combustion systems can be developed.

Engine combustion research, a major activity in the ECUT Program, is focusing on basic understanding of the phenomena occurring in internal combustion engines. In FY 1981, combustion research proceeded along several lines including: completion of the fabrication, assembly, and checkout of a specially designed single-cylinder diesel test apparatus and running initial tests aimed at verifying diesel particulate formation theories. In addition, detailed experiments were conducted and data collected to verify intake process models. This work is closely coordinated with, and coupled to, industry research. The cooperative research in combustion under ECUT has served as a model for other Government/industry research ventures. It is intended that with the resulting expanded knowledge the industry will improve engine efficiencies while producing cleaner exhaust in the process. This is in harmony with the need for increased energy productivity and increased competitiveness of the U.S. automobile industry.

Several new technical projects were initiated in FY 1981. These include research on: new Stirling cycle concepts, evaluation of improved catalysis techniques and materials to increase efficiencies of producing industrial chemicals, and evaluation of heat exchanger techniques with significantly improved effectiveness and reliability for industrial heat recovery.

Specific accomplishments achieved in FY 1981 are all the more significant especially in light of this being the first year of operation for the program. The following FY 1981 accomplishments are consolidated according to end-use sector technology:

Buildings and Community Systems Technologies (Private Sector)

- o Over 500 operating hours have been completed on an advanced concept, experimental Stirling engine resulting in 32% efficiency improvement.

Industrial Technologies (Private Sector)

- o Significant contributions to the technology of industrial heat exchangers include:
  - Completed 500-hour durability tests on tubular ceramic recuperator materials.
  - Developed data on flow-induced vibration thresholds and fouling and acid corrosion.
  - Tested advanced heat exchanger concepts including heat pipes, direct contact heat exchangers, and fluidized bed heat exchangers and evaporators.

Transportation Technologies (Private Sector)

- Improvements in mathematical design techniques used to analyze performance of engine combustion systems.
- Adaptation of advanced laser-based measurement methods to experimental studies of engine performance.

Department of Energy
FY 1982 Congressional Budget Request

Key Activity Summary

Energy Conversion and Utilization Technology

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Stratified-charge engine technology	Conduct research and experiments leading to data required to verify intake process computer models.	Conduct research effort leading to verification of analyses of intake, fuel preparation, and exhaust processes.
Diesel engine technology	Complete preparations for single-diesel cylinder experiments.	Conduct experiments; develop analysis techniques.
	Conduct research efforts directed at demonstration of in-cylinder diesel particulate formation mechanisms.	Develop and verify analyses of diesel emissions processes.
Heat exchangers technologies	Research into heat exchanger designs to overcome problems of flow-induced vibration in shell & tube heat exchangers.	Research into methods for low-cost manufacturing of spirally fluted, enhanced-performance heat exchanger tubes.
	Development and dissemination of a validated computerized heat exchanger network optimization algorithm.	Aluminized coatings for low-cost metallic heat exchangers.
Chemical processes technology	Exploratory development of biochemical process technology for the production of chemical feedstocks from agricultural wastes.	Research into heterogeneously catalyzed selective conversion of coal/biomass-derived synthetic gas into high yields of low molecular weight chemical feedstocks.
	Research to increase stability of catalyst supports used in production of ammonia fertilizers.	Exploratory development of a low-energy process for production of cement.

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Cycles technologies	Identify technology needs and assess relative importance of component constraints for free-piston and for large kinematic Stirling engine concepts. Included will be investigation of problems associated with combustor designs for multifuel use.	Continue efforts initiated in FY 1981.
	Initiate research activities to examine feasibilities of advanced Stirling engine concepts and component processes.	Increased emphasis will be directed to understand heat flow and transfer aspects common to Stirling cycles; analytical techniques will be developed and appropriate experiments will be conducted.
Stirling engines technologies	Research efforts will be initiated to examine potential of selected methods for increasing reliability and overall cycle performance.	Continue effort initiated in FY 1981.
	Advanced configuration will be examined and applicable cycle analyses will be performed to evaluate relevant engine concept improvements.	Assess the feasibility of developing a third generation Stirling engine concept.
Automotive engine materials technologies	Assessment of materials requirements of light-duty adiabatic diesel engines (ADE).	Research on bonding of zirconia coatings to metal for ADE piston heads.
	Long-range ordered alloys for high-temperature engines.	Research into improved methods of non-destructive testing for ceramic engine components.
Residential and commercial furnaces technologies	Develop fuel-dependent analysis techniques and experiments that will be used to examine combustion process differences relative to alternative fuels.	Continue efforts initiated in FY 1981.
		Initiate research on advanced concepts for use of alternative fuel without compromise of performance and environmental impact.

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Building insulation technologies	Research to slow the insulating performance degradation characteristic of currently marketed urethane foam insulating materials.	Research on high performance "superinsulating" materials for building applications.
Energy from waste processes technologies	Reliability analysis of solid urban waste handling systems.	Research to characterize and produce pure-culture hardy organisms for production of methane from cellulosic waste products.

Program Direction	$700	$700	$190

The FY 1982 request includes funding to support 4 full-time permanent positions and an estimated 6 full-time equivalent staff years of effort.

Energy Impact Assistance

This program was designed to assist local governments and other eligible jurisdictions in coping with adverse impacts associated with energy resource development projects. Federal financial assistance, which was authorized by Section 601 of the Powerplant and Industrial Fuel Use Act of 1978 (P.L. 95-620), was targeted specifically to coal and uranium production areas.

Energy Impact Assistance $62,000 $62,000 1/ $0

The FY 1982 request for this activity was $0 because substantial fiscal retrenchment will be necessary to achieve the goals of the President's Economic Recovery Program. In these circumstances, in particular, further funding for this program cannot be justified. More importantly, concerns addressed by this program are chiefly the responsibility of State and local governments working together with private sector developers. States affected by energy development have the potential to reap enormous revenues from such activity which would be more than sufficient to cover associated impacts on public services. Additional assistance is available through other Federal programs for which State and local governments may be eligible in unusual circumstances.

1/ A recission request of $52,000,000 in FY 1981 is being submitted.

Department of Energy

FY 1982 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Residential/Commercial Retrofit

The Residential/Commercial Retrofit (R/CR) program was designed to demonstrate new ways of delivering energy conservation services to the buildings sector. Such a program is wholly unnecessary and at odds with this Adminstration's energy policy. Freeing up the play of normal market forces, continuing and improving investment incentives and bringing about economic recovery will provide an adequate climate for new conservation businesses to develop and prosper if they prove able, on their own merits, to offer an attractive and economical product and service.

FY 1982 CONGRESSIONAL BUDGET REQUEST
Energy Conservation
Conservation
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Residential/Commercial Retrofit (CS)			
Operating expenses.....	$26,165 1/	$26,165	0
Program Direction.....	0 2/	0	0
Total, Operating Expenses..	26,165	26,165	0
Total, Residential/Commercial Retrofit	$26,165 3/	$26,165	0

Authorization: Energy Security Act, Pub. L. 96-294 (Title V, Subtitle C, D, and F), Federal Nonnuclear Energy Research and Development Act, Publ. L. 93-577 (Section 3 and 4)
Federal Energy Administration Act, Pub. L. 93-275 (Section 5(6)(7)).

SUMMARY OF CHANGES

FY 1981 Appropriation Enacted.....	$26,165 1/
FY 1982 Base.....	$26,165
Program Increases and Decreases:	
Additional innovative delivery system projects.....	$-14,300
Grants to States for auditor training.....	-9,665
Completion of rulemaking for CACS and review of utility/State plans.....	-2,200
FY 1982 Budget Request.....	$ 0

1/ The $26,165,000 for Residential/Commercial Retrofit is included in other FY 1981 budget line items of Buildings and Community Systems as follows:

BCS Subprogram	FY 1981 Appropriation	Distribution of FY 1981 Appropriation BCS Subprogram	Residential/Commercial Retrofit (R/CR) Program
Buildings Systems	$ 34,325	$ 17,825	$ 16,500
Residential Conservation Services (RCS)	$ 14,865	$ 5,200	9,665
			$ 26,165

2/ Salary, benefits, and travel for Residential/Commercial Retrofit staff are included in Program Direction for Buildings and Community Systems ($710,000)

3/ Does not reflect a $19,965 rescission which is proposed for FY 1981 and is addressed in separate BCS Summary tables.

Residential/Commercial Retrofit.....	$26,165	$26,165	$0

DOE/CR-0011/3
VOLUME 2 of 7

REVISED CONGRESSIONAL BUDGET REQUEST

FY 1982

VOLUME 2

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

FEBRUARY 1981
U.S. DEPARTMENT OF ENERGY
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

NOTE: Only those pages from Volume 2 of the DOE FY 1982 Revised Congressional Budget Request, pertaining to Conservation and Renewable Energy programs, have been included herein.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

SOLAR ENERGY R&D

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Department of Energy
FY 1982 REVISED CONGRESSIONAL BUDGET REQUEST
Program Overview
Solar Energy

The DOE Solar Program supports research and development of solar energy technologies. Solar energy presently supplies two percent of the national energy demand, and is expected to significantly increase its potential contribution to the future energy supply of the country.

The nation's solar energy resources can contribute to the long term strength and security of the United States. Solar energy can provide an energy source that is essentially inexhaustible, that is, not subject to supply disruptions or price manipulation. Further, solar energy is sufficiently flexible to be employed in either small decentralized applications or used as a portion of larger utility networks, and is sufficiently dispersed geographically to be useful in nearly all areas of the country.

Federal support for solar is based on providing realistic price signals through deregulation of oil and natural gas, residential and business investment tax credits, and research and development of promising solar technologies through proof of concept. Near term technology development and commercialization of solar energy is left to the private sector. Tax credits, including a 40% residential credit will continue and will help the solar market continue its healthy growth over time. The new Administration has also proposed an easing of regulatory burdens and accelerated depreciation of capital investments that will give private industry additional ability to respond to the incentives for solar energy.

The DOE Solar Program is designed to provide initial support to industry in bringing a new and diverse set of solar products, techniques and services to the buildings, industrial, and power applications markets. This support focuses on high-risk research and development of innovative technology applications leading to private sector market introduction of a product, technology or service. Such activities include basic and applied research, engineering development, and testing through proof of concept. This includes R&D of passive photovoltaic and active solar components and subsystems; R&D on feedstocks into measurable energy; and R&D on large and small wind systems. Information on technical characteristics and performance data will be made available to the public so that potential users can assess the costs and benefits of solar.

The DOE Solar Program consists of three Solar Applications Programs--Buildings, Industrial, and Power Applications. Within these Solar Applications Programs are seven technologies: Active, Passive, and Photovoltaics in the Applications for Buildings Program, Thermal and Biomass Energy Systems in the Applications for Industry Program, and Wind and Ocean Energy Systems in the Power Applications Program. No funds are requested for the ocean energy systems program in FY 82. Ocean thermal energy conversion should be readily developed by private industry if it is found to be cost competitive. In addition, other programs are underway to further the attainment of program goals. They are the International Solar Energy Program, Solar Information System, Solar Energy Research Institute (SERI), and Program Direction. Each of these programs is managed directly by DOE.

In addition, the Solar Program Office works closely with other DOE offices, Federal, State, regional and local agencies, and private institutions. Such efforts are coordinated by DOE to meet the federal goal of providing reliable and cost-effective solar technologies. Also included within the FY 1982 request for the Solar Energy program is funding to support cross cutting, multi-program activities, such as, policy, planning, evaluation, budget and management.

The objectives and activities of each element and subprogram of the DOE Solar Program are described in the following sections.

Solar Building Applications

The Solar Applications for Buildings subprogram consists of three solar technologies that will make a major contribution to the energy needs of the buildings sector.

The objective of the Solar Applications for Buildings subprogram is to accelerate the rate at which solar energy produces a significant amount of energy for the buildings sector of the U.S. economy. This DOE subprogram supports the product development process in the private sector by using direct funding, information, and incentives to leverage private and public sector resources to achieve maximum benefits of impacts. The Solar Applications for Buildings subprogram will provide funds to support basic and applied research, technology development and limited prototype system testing of longer term advanced applications such as active and passive cooling and residential photovoltaic systems. More specifically the Solar buildings subprogram includes the following three elements:

Active Solar Heating and Cooling: Support to the solar and heating, ventilating, and air conditioning (HVAC) industry and research laboratories for basic and applied research, technology development, and prototype system testing of advanced solar cooling systems, solar assisted heat pumps, and solar ponds.

Passive and Hybrid Solar Energy: Support to the solar and building industry and research laboratories for basic and applied research, technology development, and prototype system testing of advanced passive cooling systems for residential and commerical buildings, and for advanced passive components and materials.

Photovoltaics Energy Systems: Support to the solar and semiconductor industry and research laboratories for basic and applied research, technology development, and prototype system testing of advanced solar cell materials, arrays, and residential systems.

Solar Industrial Applications

Solar Thermal Energy Systems and Biomass Energy Systems are conducting research and development activities to develop cost-effective solar concentrating collector and biomass systems. These programs provide a technical base for the integration of solar systems with industrial applications for:

- The production of high grade heat for industrial processes

- o Provision of heat and electrical needs in combination for industrial uses

- o The production of electricity

- o Production of liquid, gaseous, petroleum substitutes, and other energy-intensive products

Particular emphasis in this subprogram is being placed in the identification, research and development, and testing of Solar Thermal and Biomass systems that have the most direct application in the Industrial Sector. However, the broader perspective for this subprogram requires a focusing of the potential applications of all Solar Technologies in the Industrial Sector. The Solar Industry Subprogram consists of the following two elements:

Solar Thermal Systems: The Solar Thermal program element undertakes research and development on the most promising long term solar thermal systems producing process heat and electricity.

Biomass Energy Systems: The Biomass program element supports high risk research and development on ways to produce and convert biomass feedstocks into usable energy. These systems will reduce long-term United States dependence on oil and gas.

Solar Power Applications

The Solar Power Applications Subprogram consists of research and development activities for solar technologies applicable to the electric utility sector. Particular emphasis has been on the development of wind energy and ocean energy systems, however, no funds are being requested for the ocean energy program in FY 82. The subprogram also includes efforts to determine the potential applicability of all solar power technologies in the utility sector. The FY 82 program includes:

- o Research and technology development of wind system components and concepts for utility use, rural residential and agricultural use, and assessments of U.S. wind resources.

- o Development of analytical tools and performance of comparative cost-benefit analysis of utility impact and contribution for the solar power technologies, i.e., wind, ocean, solar thermal electric, photovoltaics, and biomass.

To support the development of solar power technologies, research and development efforts on the most promising are carried out so that a sound and competitive industrial base can arise through private initiatives. Information is provided to industrial users and decisionmakers in the performance and capability of long-term high risk solar power systems, and assistance is provided to the private sector to address those non-technical issues that could delay the introduction of solar power technologies. The specific program element of the Solar Power Applications subprogram is:

Wind Energy Systems: The Wind Energy program element is intended to support longer term technology improvements that will result in higher performance and

reduced cost of energy produced by wind machines and thereby provide a significant contribution to the Nation's energy production by the year 2000.

International Solar Energy Program

A separate line item has been established for international solar activities that are DOE committments but cannot be justified on a programmatic basis as part of a domestic technology program (e.g. photovoltaic, solar thermal). This was done to prevent those international agreements made primarily for reasons other than obtaining domestic solar program objectives from competing for funds against the various solar technology programs.

Solar Information System

The Solar Information System activities are intended to share the results of Federal solar energy R&D programs with interested private sector firms, universities, and individual citizens in an effort to promote the widespread use of solar energy resources. Major program efforts are implemented through the Solar Energy Information Data Bank (SEIDB) and include:

- Data collection and data base development
- Consolidation of heretofore separately managed activities into a cost effective network for the dissemination of technical solar information
- Maintenance of hotlines for handling inquiries and referrals

Program Direction

The purpose of the Program Direction function is to provide sufficient full-time permanent staff to adequately address the demanding management requirements related to the conduct of the complex solar programs.

Major accomplishments completed, or anticipated in FY 1982, include:

Solar Building Applications

Active Heating and Cooling:

- Conducted successful first tests of a prototype solar/rankine chiller and of an absorption chiller using new materials that permit air cooling.
- Initiated engineering field testing of a commercial-sized solar/rankine cooling system.
- Completed performance testing of an advanced solar powered lithium bromide/water chiller with built-in evaporative cooling.

Passive and Hybrid Solar Energy

- Completed design and development of 27 prototype passive and hybrid manufactured buildings (residential and commercial).
- Initiated development of 20 manufactured products for use in passive solar heating, cooling, and daylighting systems.
- Completed design phase for 35 commercial demonstration buildings.
- Cooling test facilities began operation.
- Constructed 100 passive residential units through the DOE/HUD demonstration program.

Photovoltaics

- Demonstrated advanced solar cell efficiency of 10% for new cell materials and configurations.
- Determined the technical potential and long-term stability of cadmium-sulphide-based cells.
- Achieved FY 1980 goal of $2.80/Wp technology readiness for flat-plate and concentrator collectors.
- Established requirements and paths for achieving $0.70/Wp technology readiness.
- Several companies established multi-megawatt capacity module production lines using technologies supported by DOE.
- Initiated an aggressive balance-of-systems program.
- Completed eight major designs and commenced systems testing for residential applications.
- Selected nine intermediate-sized experimental designs for construction, awarded contracts, approved designs, and initiated construction.

Solar Industrial Application

Solar Thermal Energy Systems:

- Began operation of Solar One, the Ten Megawatt Central Receiver Solar Thermal Pilot Plant, at Barstow, California.
- Completed design and evaluation of low-temperature hot water and mid-temperature steam systems.
- Provided design and evaluation studies of parabolic trough mass production techniques suitable for low cost, high performance systems compatible with industrial process heat applications.
- Completed development of advanced high performance components and subsystems for trough collectors.
- Continued operation of the Central Receiver Test Facility in support of receiver development and heliostat characterization.
- Performed concept definition of advanced solar thermal systems and laboratory-scale testing of solar fuel processes.

Biomass Energy Systems:

- Completed preliminary regional wood resource assessment.
- Completed conversion of three industrial boilers to wood fuel use in the Southeast region (cost-shared projects).
- Evaluated feasibility of diesel fuel substitutes from oil seed crops.
- Modified fluid bed gasification Process Development Units (PDU) to allow operation under pressure.
- Completed study of biomass liquefaction processes at the Albany, Oregon PDU.
- Characterized and evaluated oil derived from wood by two biomass liquefaction processes.
- Field-tested mobile tree harvester.
- Evaluated mesquite species as a potential addition to an expanded biomass resource base.
- Completed preliminary evaluation of mechanization of production and harvesting systems for tropical grasses.
- Constructed a prototype freshwater microalgal production facility.

Office of Solar Power Applications

Wind Energy Systems

Rural Residential and Agricultural Applications:

- Continued field testing of the 17 meter vertical-axis Darrieus type machine.
- Began a program to address institutional and economic issues in which machines are being installed in cooperation with a number of state energy offices (or equivalents) and the barriers and deterrents analyzed.
- Continued testing of commercially-available small wind machines and prototypes at DOE's Rocky Flats Plant.

Electric Utility Applications:

- Conducted performance and reliability evaluation of intermediate and large systems first-generation machines in a variety of operational environments.
- Conducted test operations of intermediate-scale MOD-OA (200 kw, 125 ft. diameter) systems with utilities at Clayton, New Mexico; Culebra, Puerto Rico; Block Island, Rhode Island; and Oahu, Hawaii.
- The Clayton machine has operated for nearly 7,000 hours and has produced over 600,000 kwh to the local grid. The Hawaii machine has been operating at a load factor of over 50 percent.
- The Mod-1 (2000 kw, 200 ft. diameter), the first experimental utility class wind turbine, is undergoing tests by the Blue Ridge Electrical Membership Corporation at Boone, North Carolina, and has proved that megawatt scale wind turbines are feasible.
- The first of the second-generation Mod-2 (2,500 kw, 300 ft. diameter) wind turbine has been in operation on the Bonneville Power Administration network at Goldendale, Washington, since November 1980.
- Two additional Mod-2 units will be installed in 1981 to form the first multi-unit cluster. The Mod-2 is the largest wind turbine ever constructed and also represents a factor of two improvements over the Mod-1 in terms of projected cost of energy in commercial production.
- Initiated Competitive contracts for the preliminary concept design of third-generation large systems (Mod-5).

Solar International Activities

- U.S. - Saudi Arabia Joint Solar Energy Project:
  - Joint Funding: $100,000,000 over 5 years.
  - Projects involve urban, rural/agricultural and industrial applications.
  - Major projects: a 350 kw photovoltaic power system for two remote Saudi Arabian villages; solar cooling field experiments in the United States; and solar desalination.

Solar Information Activities

- Solar Energy Information Data Base (SEIDB) Network Bulletin (SEIDB Insider) created and 5 issues distributed.
- SEIDB Management Coordination Group (Solar Energy Research Institute, Regional Solar Energy Center, National Solar Heating & Cooling Information Center, DOE Management) established.
- SEIDB Network Coordination Office established.
- Training Workshop and Seminar Program for Participant Organization Staff underway.
- Established the Document Distribution Service which:
  - Built 73 solar mailing lists containing over 60,000 names
  - Distributed over 227,000 hard copies and 3,500 microfiche copies of SEIDB documents and SERI technical reports
  - Served 41,548 individual requests.
- Acquired, indexed and cataloged approximately 68,000 bibliographic items through FY 1979.
- Developed bibliographic data base of 25,000 items with bibliographic citations, abstracts and index terms accessible to the SEIDB network via on-line computer access.
- Handled over 20,000 inquiries, referrals, literature searches and inter-library loan requests through FY 1979 from the solar community at large.
- Initiated a program to establish SEIDB-wide bibliographic standards.

COST BENEFIT ANALYSIS FOR SOLAR PROGRAMS

Cost-benefit analysis is used in the Federal solar program in two ways: to examine the balance within technologies and across the overall program, and to evaluate particular options within a program. Any analysis requires assumptions about the future, including conventional energy prices, success or failure in R&D programs and the response of industry and users. The overriding criteria is net benefit from society's point of view, using the marginal cost of alternatives. Potential market size and cost of any technology are the driving factors in computing social value but environmental considerations and potential displacement of depletable resources also play a role. Uncertainty in these critical variables often make rigorous benefit-cost analysis difficult, however. The other principal concern is the appropriate Federal role. It is administration policy that the Federal government should not sponsor research and development that industry would be expected to undertake on its own, but rather should concentrate on those programs with social benefits which are not expected to be pursued without a Federal role (e.g. long term, high risk, but potentially high pay-off R&D).

The general approach is to measure the national value of new technologies and quantify to the maximum extent possible, the value of Federal government actions. These values are compared with the cost of government programs to obtain a measure of cost-benefit.

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Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars In Thousands, Narrative Material In Whole Dollars)

	FY 1980 APPROPRIATION	FY 1981 * APPROPRIATION	FY 1982 BASE	FY 1982 REQUEST
DIRECT SOLAR ENERGY				
I. Active Solar Heating & Cooling				
Operating Expenses...	$ 55,400	$ 42,450	$ 42,450	$ 11,000
Capital Equipment....	1,500	1,250	1,250	500
TOTAL	56,900	43,700	43,700	11,500
II. Passive Solar Heating & Cooling				
Operating Expenses...	27,450	32,900	32,900	10,100
Capital Equipment....	500	500	500	200
TOTAL	27,950	33,400	33,400	10,300
III. Photovoltaics				
Operating Expenses...	142,745	153,200	153,200	55,900
Capital Equipment....	7,300	7,000	7,000	7,000
TOTAL	150,045	160,200	160,200	62,900
IV. Thermal Energy Systems				
Operating Expenses...	103,105	105,650	105,650	42,650
Capital Equipment....	3,000	4,250	4,250	1,350
Construction.....	37,095	31,850**	31,850**	0
TOTAL	143,200	141,750	141,750	44,000
V. Biomass Energy Systems				
Operating Expenses...	32,500	45,750	45,750	19,500
Capital Equipment....	500	750	750	1,000
TOTAL	33,000	46,500	46,500	20,500
VI. Wind Energy Systems				
Operating Expenses...	42,415	83,700	83,700	19,200
Capital Equipment....	1,400	2,100	2,100	200
Construction.....	16,740	0	0	0
TOTAL	60,555	85,800	85,800	19,400
VII. Ocean Energy Systems				
Operating Expenses...	31,600	38,300	38,300	0
Capital Equipment....	700	700	700	0
Construction.....	10,700	0	0	0
TOTAL	43,000	39,000	39,000	0

* Includes rescission of $95,150,000 proposed by the new administration
**Includes $8,000,000 deferred from FY 1980 for Barstow project

VIII.	International Solar Energy Program				
	Operating Expenses...	0	12,000	12,000	4,000
IX.	Solar Information				
	Operating Expenses...	0	1,400	1,400	6,700
X.	Solar Energy Research Institute				
	Construction.....	6,900	5,000	5,000	0
XI.	Program Direction	6,029	6,786	6,786	4,000
XII.	Alcohol Fuels				
	Operating Expenses	20,000	20,800	20,800	10,000
	Construction	2,000	2,500	0	0
	TOTAL	22,000	23,300	20,800	10,000
	TOTAL SOLAR ENERGY				
	Operating Expenses...	461,244	542,936	542,936	183,050
	Capital Equipment....	14,900	16,550	16,550	10,250
	Construction.....	73,435	39,350	36,850	0
	TOTAL	549,579	598,836	596,336	193,300
	Less Congressional Reduction	0	- 20,200	- 20,200	0
	TOTAL SOLAR ENERGY	$549,579	$578,636	$576,136	$193,300

Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars in Thousands, Narrative Materials in Whole Dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Active Heating and Cooling				
Solar Hot Water	$26,510	$16,280	$16,280	$ 0
Space Heating	10,170	13,830	13,830	0
Solar Ponds	0	0	0	1,000
Solar Assisted Heat Pump	7,010	1,340	1,340	1,800
Solar Cooling	11,710	8,000	8,000	8,200
Total Operating Expenses	$55,400	$39,450	$39,450	$11,000
Capital Equipment	1,500	1,250	1,250	500
Congessional Adjustment	0	3,000	3,000	0
Total Budget Authority	$56,900	$43,700*	$43,700	$11,500

*Rescission of $2,300,000 is being proposed by the new administration.

Authorization: Sec. 5-17; P.L. 93-473 Solar Energy Research, Development and Demonstration Act

Summary of Changes

FY 1981 Appropriation Enacted and FY 1982 Base	$43,700
Active Heating and Cooling Program Increases and Decreases	
Congressional Reduction	- 3,000
Increase in Solar Pond Technology Development	+ 1,000
Increase in Absorption, Rankine, and Desiccant Cooling Technologies Development	+ 200
Decrease in Solar Water Heating	-16,280
Decrease in Space Heating	-13,830
Increase in Solar Assisted Heat Pump Research and Development Program	+ 460
Decrease in Capital Equipment	- 750
FY 1982 Budget Request	$11,500

Active Heating and Cooling.....$43,700,000.....$43,700,000.....$11,500,000

Immediate Active Heating and Cooling system objectives are: Continued development and testing of advanced and improved systems, control methods, and devices; development of high efficiency collectors for Rankine cooling technology; development of desiccant and absorption integrated cooling systems prototypes; technology development of high performance solar assisted heat pump components; applied research and development of solar ponds for low temperature thermal applications.

Research and Development work is supported in five areas: Solar Assisted Heat Pumps, Solar Ponds, Absorption, Rankine, and Desciccant Cooling. FY 1982 funding for these elements are as follows:

a. Solar Ponds.....$1,000,000

The objectives of this program are to help the private sector: (1) to develop system configurations which can effectively utilize heat from solar ponds for both space heating and low temperature industrial process heating; (2) to develop technically feasible means of controlling the energy removal from existing prototype ponds; (3) to develop heat exchangers and heat conversion components which operate efficiency at low temperatures; (4) to identify the diffusion, and thermal and hydrodynamic factors related to wind, temperature changes and freezing. The requested funds will support the following:

- Technology Development ($1,000,000)

  System Analysis and Development ($350,000)

  Development of control and heat extraction techniques and related components ($400,000)

  Supportive applied R&D work in area of diffusion, thermal and hydrodynamic stability ($250,000)

b. Solar Assisted Heat Pump (SAHP).....$1,800,000

The objective of this program is to help the private sector develop new high performance SAHP components and to develop total systems which integrate the most promising technological advances. Research and development efforts will focus on storage, collectors, controls and materials. The funds requested will provide for the following:

- Technology Development ($1,800,000)

  Design Prototype SAHP Systems ($600,000)

  Fabricate Prototype SAHP Systems ($1,200,000)

c. Rankine, Absorption and Desiccant Cooling.....$8,200,000

The objective of this program element is to help the private sector develop the technology for solar space conditioning, essential to efficient personal function and industrial productivity in major areas of the country, associated with significant fossil energy displacement.

Ongoing DOE development efforts for the Rankine and absorption chiller components have produced prototype systems which appear promising. Parallel successful developments in related technologies (collectors, storage, controls and materials) now support the development of complete systems and thereby provide benefits to solar heating technologies as well. Development efforts will be focused on critical components to meet cost effectiveness and reliability goals already established.

Current development efforts on desiccant chillers indicate their potential; therefore, development will continue in the areas of materials and chiller configurations to identify the most promising candidates.

The requested funds will support:

o Technology Development ($8,200,000)

Rankine

Research and Development for Advanced High Performance Collectors ($400,000)

Advanced Systems Analysis ($500,000)

Advanced Prototype Systems Development ($2,450,000)

Absorption

Research and Development of Key Components ($600,000)

Advanced Systems Analysis ($600,000)

Advanced Prototype Systems Development ($2,850,000)

Desiccant

Research and Development of Desiccant Materials and Components; Prototype Systems Development ($800,000)

d. Capital Equipment.....$500,000

Funds requested will provide the necessary instrumentation and test equipment to accomplish field and laboratory testing of the active heating and cooling technology.

Department of Energy
Active Heating & Cooling
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Develop Production Absorption Solar Cooling Systems	Contract with industry for System Integrators to produce absorption systems. Develop production type absorption chiller and system components; design and specify prototype systems, initiate fabrication of system components. Develop and evaluate advanced absorption chiller techniques.	Fabricate and install prototype production absorption chiller system for residential and commercial building applications. Complete development and evaluation of advanced absorber chiller technique.
Develop Production Rankine Solar Cooling Systems	Contract with industry for System Integrators to produce Rankine Systems. Complete development of selected Rankine chillers; design and specify prototype systems; initiate fabrication of system components.	Fabricate and install prototype production Rankine chiller systems for commercial building applications.
Develop Desiccant Solar Chillers	Evaluate the basic desiccant chiller concepts using open cycle and closed cycle configurations; develop reliable desiccant materials.	Define and evaluate workable system configurations. Select the most promising concepts for production considerations.
Solar Assisted Heat Pump	Estimated for 1981; Complete high performance SAHP development and begin testing. Determine optimum solar collected storage combinations for SAHP. Continue multiple slide screw compressor development.	Select system integrators and initiate system design activity. Complete testing of high performance SAHP designs.
Solar Ponds	No funding in FY 1981	Identify low temperature thermal applications for existing U.S. thermal ponds; develop related heat extraction techniques; continue supportive research and develop work in the areas of diffusion, thermal and hydrodynamic stability.

Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Passive and Hybrid				
Residential Heating	$11,700	$15,100	$15,100	$ 0
Residential Cooling	4,400	2,500	2,500	4,400
Commercial Heating	3,800	5,600	5,600	0
Commercial Cooling	2,890	3,100	3,100	4,600
Products	2,760	2,500	2,500	1,100
Solar Cities and Towns	1,900	2,000	2,000	0
Agriculture	-	400	400	0
TOTAL OPERATING EXPENSES	$27,450	$31,200	$31,200	$10,100
Congressional Adjustment		1,700	1,700	
Capital Equipment	500	500	500	200
TOTAL BUDGET AUTHORITY	$27,950	$33,400*	$33,400	$10,300

*Rescission of $1,500,000 is being proposed by the new administration.

Authorization: Sec. 5-17, P.L. 93-473--Solar Energy Research and Development Act

Summary of Changes

FY 1981 Appropriation Enacted and FY 1982 Bases	$33,400
Passive and Hybrid Energy Systems	
Program increase and decreases.	
Congressional Reduction	-1,700
Decrease in Residential Building Heating	-15,100
Decrease in Commercial Building Heating	-5,600
Increase in Residential Cooling & Commercial Cooling	+3,400
Decrease Materials and Components	-1,400
Decrease in Solar Cities and Towns	-2,000
Decrease in Agriculture	- 400
Decrease in Capital Equipment	- 300
FY 1982 Budget Request	$10,300

Passive and Hybrid Solar Energy...$33,400,000.....$33,400,000.....$10,300,000

The objective of this program is to help the private sector introduce Passive and Hybrid Solar Technologies in building applications by supporting longer term R&D on residential building cooling, commercial building cooling, and materials and components.

a. Residential Building Cooling.....$4,400,000

The budget request provides support for basic research and development on evaporative, radiative, ventilation and dehumidification components and prototype systems for residential buildings. The requested funds will support:

- o Basic and Applied Research ($600,000)

  Analysis of basic physical phenomena of desiccant, evaporative ventilative and radiative cooling systems ($600,000)

- o Exploratory Development ($1,300,000)

  Advanced concept analysis for new and retrofit cooling systems including roof ponds, 2-stage evaporative/rockbed systems and nightsky cooling systems ($500,000)

  Development of performance analysis tools developed for new residential systems integrated with active and conservation technologies ($800,000)

- o Technology Development ($2,500,000)

  Ten instrumented buildings to provide detailed component and system performance data ($900,000)

  System performance simulation of comparative active and passive residential cooling systems ($500,000)

  Testing of advanced passive and hybrid cooling systems for hot-dry and warm-humid climates involving desiccant, earth integrated and dehumidification concepts. Testing will be conducted at three experimental facilities ($1,100,000)

b. Commercial Building Cooling.....$4,600,000

The budget request provides support for basic research and development of advanced solar-driven ventilation, ground cooling, thermal activated components and evaporative systems for commercial buildings.

The requested funds will support:

- o Basic and Applied Research ($1,100,000)

  Analysis of basic physical phenomena of solar-driven ventilation systems, passive lighting, thermal chimneys, and evaporative cooling concepts ($600,000)

  Applied heat transfer analysis of multizone buildings ($500,000)

- o Exploratory Development ($1,700,000)

  Advanced concept analysis and systems design for combined hybrid heating, cooling, and passive lighting systems in large-scale building applications ($600,000)

  Development of analysis tools and computer models for ventilation, radiative, roof pond, thermal chimney, and evaporative systems ($1,100,000)

- o Technology Development ($1,800,000)

  Experimental testing of cooling and daylighting subsystems to determine thermal performance and to validate analysis tools and models ($950,000)

  Systems performance simulation of optimum active/passive and conventional mechanical systems ($850,000)

c. Materials and Components.....$1,100,000

The objective of this program element is to support industry in the development of high performance advanced Passive and Hybrid materials such as selective surfaces, glazing films and control devices.

The budget request is based on the research and development of innovative components necessary to increase performance and reduce cost of passive and hybrid systems. The funds requested will provide for the following:

- o Technology Development ($1,100,000)

  Development of test procedures and methods for residential and commercial passive heating and cooling, materials, and components ($800,000)

  Laboratory testing of movable insulation/glazing assemblies, desiccant wall systems and integrated collector/storage assemblies ($300,000)

d. Capital Equipment.....$200,000

Monitoring and performance data acquisition and analysis packages ($200,000)

Department of Energy
Passive and Hybrid Solar Energy
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Residential Building Cooling	Basic physical phenomena analysis	Experimental test and analysis
	Test cell operations analysis and validation	Develop analysis tools
	Technology Transfer and Design Handbooks	
	Engineering Field Testing	
Commercial Building Cooling	Basic and applied research Preliminary design	Assist industry in developing prototypes
	Begin hot/arid experimental data collection/monitoring	Hot/arid experiment data analysis
	Initiate passive cooling project with industry	Initiate analysis tools
	Engineering Development	
	Technology Transfer	
Materials and components	Laboratory test of materials	Materials Research & test procedures complete
	Materials and components, Phase II, final design	
	Component Development for storage and collectors	
	Initiate standards test procedures	Standard test procedures

Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars.)

	FY 1980 Appropriation	FY 81 Appropriation	FY 1982 Base	FY 1982 Request
Photovoltaic Energy Systems				
Advanced Research and Development	$ 41,700	$ 43,650	$ 43,650	$ 44,000
Technology Development	59,000	56,850	56,850	11,900
Systems Engineering and Standards	14,500	14,300	14,300	-0-
Tests and Applications	24,500	14,700	14,700	-0-
Market Development	3,045	17,700	17,700	-0-
TOTAL OPERATING EXPENSES	$142,745	$147,200	$147,200	$55,900
Congressional Adjustment		$ 6,000	$ 6,000	
Capital Equipment	7,300	7,000	7,000	7,000
TOTAL BUDGET AUTHORITY	$150,045	$160,200*	$160,200	$62,900

*Rescission of $21,000,000 is being proposed by the new administration.

Authorization: Sec. 6; P.L. 93-473--Solar Energy Research and Development Act
Sec. 8; P.L. 93-473--Solar Photovoltaics Energy Research and Development Act

SUMMARY OF CHANGES

FY 1981 Appropriation Enacted and FY 1982 Base..... $160,200

PHOTOVOLTAIC ENERGY SYSTEMS

Program increase and decreases.

- o Congressional reduction..... -6,000
- o Eliminates all multiple parallel paths for each task in Low Cost Solar Array project, the concentration, component development activities, and Balance of System activities..... -44,950
- o Eliminates the advanced residential prototypes in NE, SW, and SE Residential Experimental Stations..... -14,300
- o Eliminates the Initial System Evaluation Experiment Program..... -14,700
- o Elimination of Market Development activity..... -17,700

FY 1982 Budget Request..... $ 62,900

Photovoltaics.....$160,200,000.....$160,200,000.....$62,900,000

The objective of the Photovoltaic Program is to maintain high probability of major photovoltaics research breakthrough, which will result in array prices of $.15 - .40 per peak watt (1980$), with systems cost of $1.10 - 1.80 per peak watt by undertaking advanced R&D. This will permit penetration of centralized utility markets. The program continues to leverage industry, which thus far has spent about $50,000,000 on R&D, constructed about $50,000,000 of manufacturing capacity, and has shown willingness to cost share at the 40% level in residential experiments.

Effort will be conducted in only two areas: Advanced Research and Development and Technology Development. The FY 1982 funding for these elements are as follows:

a. Advanced R&D.....$44,000,000

The Advanced Research and Development effort will fund:

- o Polycrystalline silicon devices ($5,000,000)
- o Amorphous Silicon material and devices ($5,000,000)
- o Other thin-film devices ($4,000,000)
- o Basic photovoltaic research measurements, insolation studies ($2,000,000)
- o SERI Photovoltaic research--In-house ($2,000,000)
- o Advanced innovative concentrator devices and subsystems ($4,000,000)
- o Advanced systems research ($6,000,000)
- o Improved single crystalline silicon device development ($5,000,000)
- o Advanced systems components development ($3,000,000)
- o Supporting research and development ($4,000,000)
- o Silicon material development ($4,000,000)

b. Technology Development.....$11,900,000

Funding will support the completion of critical projects in the Low-Cost Solar Array Program managed by the Jet Propulsion Laboratory and in the Balance-of-Systems work at the Sandia Laboratories and MIT Lincoln Laboratory.

The following areas of the Low-Cost Solar Array Project will be funded:

- o Production processes and equipment ($6,000,000)
- o Encapsulation and advanced cell technology development ($1,000,000)
- o Operations, Engineering and management ($2,000,000)
- o Systems experiments ($2,900,000)

c. Capital Equipment.....$ 7,000,000

Funding requested will provide for the necessary instrumentation and associated test equipment required for laboratory and field testing of Photovoltaic equipment.

Department of Energy
Photovoltaic Energy System
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Advanced Research & Development	Initiate ten high-risk research grants	Continue development of advanced thin films
Technology Development	Accelerate development of technology readiness power conditioning and module hardware	Achieve technology readiness for at least one flat-plate and one concentrator module

Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Solar Thermal Energy Systems				
Research and Advanced Development	$ 21,305	$ 13,600	$ 13,600	$ 21,100
Technology Development	52,800	59,550	59,550	13,050
Systems Development	15,400	29,900	29,900	6,000
Planning and Analysis	13,600	2,600	2,600	2,500
Total Operating Expenses	$103,105	$105,650	$105,650	$ 42,650
Capital Equipment	3,000	4,250	4,250	1,350
Construction	37,095	31,850*	31,850	---
Total Budget Authority	$143,200	$141,750**	$141,750	$ 44,000

* Includes $8,000 deferred from FY 80 for Barstow project.
** Rescission of $18,050,000 is being proposed by the new administration.

Authorization: Sec. 6; P.L. 93-473 Solar Energy Research and Development Act

Summary of Changes

FY 1981 Appropriation Enacted and FY 1982 Base	$141,750

Solar Thermal Energy Systems

Program increases and decreases.

Increase in Research and Advanced Development	+ 7,500
Decrease in Central Receiver Technology Development	- 11,000
Decrease in Parabolic Trough Technology Development	- 20,300
Decrease in Parabolic Dish Technology Development	- 9,500
Decrease in Other Technology Development	- 5,700
Decrease in System Development	- 23,900
Decrease in Planning and Analysis	- 100
Decrease in Capital Equipment	- 2,900
Decrease in Construction	- 31,850
FY 1982 Budget Request	$ 44,000

Solar Thermal.....$141,750,000.....$141,750,000.....$44,000,000

The primary focus of programs in Solar Thermal Energy Systems is to perform research and development sufficient to establish technical feasibility of concepts for converting sunlight to medium and high temperature heat. Concepts under development differ significantly in their temperature capability, modularity and adaptability to siting constraints, and are thus complementary. They include heliostat/central receiver systems, tracking parabolic trough and parabolic dish concentrating heat collector systems, as well as concentrating stationary hemispherical collectors and medium to large scale solar ponds.

The technical paths being pursued involve a development cycle of ten to fifteen years from concept definition to product maturity. As a result of private and Federally funded efforts to date, central receiver and parabolic trough technologies are more than halfway through this cycle. Test facility and operating systems experience over the past year has demonstrated technical feasibility of key subsystems and levels of component reliability and durability consistent with key near-term market requirements. Detailed collector production cost studies combined with cost experience from initial field installations strongly suggest that one condition for broad user acceptance is demonstration of full scale system readiness rather than projected system costs. Limited mass production of collectors being tested in the period 1981-1983 will be sufficient to reduce system costs to levels that will be acceptable in specific early markets. Commercial demonstration and mass production will be undertaken by the private sector in response to market forces.
Major milestones in FY 1982 include initial operation of Solar One (central receiver) and Shenandoah Solar Total Energy Project (parabolic dish). Tests will be conducted of a parabolic dish electric power module prototype. FY 1982 activities will also include initial operation of completed experimental 50,000 ft^2 hot water and steam systems at selected industrial plant sites. Further definition of research and development requirements for solar thermal fuels production is expected. The FY 1982 request of $44,000,000 reflects a reduction of $97,750,000 from the FY 1981 appropriation of $141,750,000 and reflects completion of the design of several feasibility experiments and completion of central receiver pilot plant construction as well as streamlining of supporting technology development activity that will be undertaken by the private sector.

a. Research and Advanced Development.....$21,100,000

- o Materials
  Explore feasibility of applying state-of-the art materials to solar heat absorption and transport requirements; identify fabrication techniques and assess durability and reliability in high temperature solar applications. Explore feasibility of existing and new polymeric materials for use in advanced, low cost concentrators; assess durability of polymers to environmental stresses. ($4,000,000)

- o Applied Research
  Continue exploratory development and bench or pilot scale testing of advanced heat receivers and other high temperature components and subsystems in concert with programs to foster innovation through university faculty and user association programs; identify long term research needs/priorities. ($6,200,000)

- o Fuels
  Continue development of baseline fuels production process, as well as feasibility studies and bench scale testing of alternate solar fuel processes. ($4,900,000)

- o Linear Parabolic Systems
  Conduct designs and exploratory development of advanced, low cost parabolic trough components and subsystems ($1,800,000)

- o Storage
  Continue thermal storage advanced development for current and future systems. ($1,500,000)

- o Solar Ponds
  Continue research and advanced development aimed at use of large naturally occurring pond sites for generation of process heat or electricity. Program is directed toward research and design studies in support of first-of-a-kind experiments. ($2,700,000)

b. Technology Development.....$13,050,000

- o Central receiver ($8,550,000)
  Continue operation of the central receiver test facility as needed to establish technical feasibility and characterize performance and reliability of advanced receiver and heliostat designs. ($3,500,000)

  Conduct designs of modifications for Solar I to facilitate data gathering & reduction. ($400,000)

  Complete conceptual designs for advanced central receiver systems for industrial heat applications; identify long-term research needs. ($1,000,000)

  Complete testing of advanced heliostats; support exploratory development of improved heliostat subassemblies. ($3,650,000)

- o Parabolic Dish Concentrators
  Conduct and or complete testing and data collection at existing parabolic dish engineering experiments, and continue operation of the parabolic dish test site. Complete development, testing and document design information obtained in Brayton and Stirling engine subassembly testing funded in prior years. ($3,100,000)

- o Linear Parabolic Systems ($700,000)
  Use facilities at SERI and user sites to complete prototype evaluation phase. Complete and document Modular Industrial Solar Retrofit (MISR) program supporting design of mass-producible modular parabolic trough systems.

- o Bowl Concentrator Systems ($700,000)
  Complete documentation of first of a kind subscale concentrator; complete evaluation of technical feasibility of 1 MWe solar fossil hybrid system experiment and related modular scale-up issues. ($700,000)

c. Systems Development.....$6,000,000

- o Operate Solar I (10 MWe Central Receiver Pilot Plant) to obtain data to verify technical feasibility of central receiver in small grid connected applications. ($4,000,000)

- o Operate Shenandoah System to obtain data and verify performance characteristics of first of a kind parabolic dish total energy concept. ($1,500,000)

- o Repowering Studies
  Complete design study extensions; summarize, document, and disseminate results of studies conducted over previous five years. ($400,000)

- o Agricultural Systems
  Summarize and document results from 250 agricultural heat experiments and related research. ($100,000)

d. Planning and Analysis.....$2,500,000

Continue support for long range planning and evaluation of ongoing technology work. Conduct analyses to identify research and development requirements.

e. Capital Equipment.....$1,350,000

The funding requested will provide the necessary instrumentation and test equipment to conduct laboratory and field testing of solar thermal systems, subsystems, and components.

Department of Energy
Solar Thermal Energy Systems
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Materials Development	Continue activities aimed at identifying limits to mirror durability. Complete evaluation of cellular glass mechanical properties. Continue efforts to test durable protective coatings for mirrors.	Evaluate superalloy and ceramic materials properties and fabrication techniques related to high-temperature applications. Assess durability of existing and new polymers.
	Complete testing of 2500°F receiver and complete design low cost dish concentrator using polymer reflector.	Continue efforts to develop innovative, more cost-effective components and subsystems.
Fuels	Issue solicitation to obtain industrial company to support management of solar thermal sun-fuels program. Continue research to identify feasible processes.	Initiate preliminary conceptual designs of first-of-a-kind fuels and chemicals production systems. Conduct process experiments to permit design of receivers.
Applied Research	Initiate university research center of excellence. Continue to seek involvement of industry and universities through efforts of Solar Thermal Test Facilities Users Association (STTF UA). Continue Summer Faculty program under American Society for Engineering Education (ASEE) auspices.	Design, build and test advanced receiver concepts and other high-temperature components. Issue solicitation for industry and university innovative concepts for testing at major solar thermal facilities. Continue ASEE summer facultly program.

Department of Energy
Solar Thermal Energy Systems
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Central Receiver Development	Complete testing of: 4 different mass-producible heliostat prototypes; IEA central receiver mirror modules; moten salt receiver panel; and Barstow production heliostats at Central Receiver Test Facility (CRTF).	Continue development testing of heliostats and advanced receivers at CRTF. Conduct design studies related to use of Solar 1 as a repowering test facility.
Linear Systems Development	Initiate testing of mass-producible parabolic through concepts. Continue testing of Coolidge parabolic trough irrigation system.	Complete testing of prototype parabolic troughs, continue testing of prototype trough components. Complete and document MISR program.
Hemispherical Bowl	Continue testing of 65-foot bowl concentrator at Crosbyton, begin design and costing study of 200-foot bowl.	Complete documentation of technical feasibility of 1 MWe bowl system and related scale-up issues.
Parabolic Dish	Complete fabrication of a low-cost dish concentrator. Complete testing of steam-Rankine and air-Brayton heat receivers and initiate feasibility testing of dish-Stirling engine subsystem at the Parabolic Dish Test Site (PDTS).	Complete testing of existing dish experiments and engine systems in PDTS.
Solar Salt Pond Development	Complete conceptual design of solar pond for Salton sea and regional applicability study.	Continue research and development aimed at use of large naturally occurring pond sites.

Department of Energy
Solar Thermal Energy Systems
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Industrial Applications	Continue design and planning of low-temperature steam projects. Complete design reviews for intermediate temperature 50,000 sq. ft. industrial heat projects.	Document results of low-temperature hot water and mid-temperature steam projects.
	Study systems appropriate for application to existing utilities and industrial facilities.	Complete and document design studies of repowering and provide results to industry.
	Collector field installed at the Shenandoah Solar Total Energy Project. Turbine acceptance testing, control and instrumentation system completed.	Complete construction and begin operation of Shenandoah Total Energy Project.
Electrical Application	Continue construction of Solar I (10MW Central Pilot Plant) at Barstow, California; tower construction completed, and heliostat field and receiver subsystems installed.	Complete construction and initiate operation of Solar I and use as central receiver test facility for repowering applications.
Agricultural	Initiate operation of on-farm solar grain drying projects.	Document results of 250 agricultural and industrial process heat experiments utilizing on-farm solar energy systems.
	Select site and complete preliminary design for Small Community Experiment. Initial operation of International Energy Agency project in Almeria, Spain.	

Department of Energy
Solar Thermal Energy Systems
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Planning and Analysis	Conduct comparative studies and analyses defining research needs.	Continue research-needs analyses and insure program integration.
	Conduct information dissemination activities to provide technical information to potential users.	Continue dissemination of technical information.
	Provide a Solar Thermal Energy Systems multi-year program plan for delivery to Congress.	

Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollar in Thousands, Narrative Material in Whole Dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Biomass Energy Systems				
Market Development	$ 7,000	$15,550	$15,550	$ 0
Systems Development	17,500	17,700	17,700	8,300
Research and Exploratory Development	8,000	8,500	8,500	11,200
TOTAL OPERATING EXPENSE:	32,500	41,750	41,750	19,500
Congressional Adjustment		4,000	4,000	
Capital Equipment	500	750	750	1,000
TOTAL BIOMASS	$33,000	$46,500*	$46,500	$20,500

*Rescission of $15,300,000 is being proposed by the new administration.

Authorization: Sec. 6, P.L. 93-473--Solar Energy Research and Development Act

Summary of Changes

FY 1981 Appropriation enacted and FY 1982 base	$46,500
Biomass Energy System	
Program increases and decreases.	
Congressional Reduction	-4,000
Decrease in biomass production R&D	-6,400
Decrease in research and exploratory development to expand biomass resource base to non-traditional crops	+2,700
Increase in capital equipment	+ 250
Decrease in biomass conversion technology R&D	-3,000
Decrease in agricultural biomass energy	-5,900
Decrease in wood energy program	-9,650
FY 1982 Budget Request	$20,500

a. Biomass. . . . . .$46,500,000. . . . .$46,500,000. . . . .$20,500,000

The goal of the Biomass Energy Program is to reduce U.S. dependence on oil and natural gas by helping the private sector develop cost-competitive biomass production systems and conversion technologies to increase the use of biomass energy in all end-use sectors of the economy. In FY 1982 emphasis is being placed on developing a broad-based, long-range research program on high risk, but potentially high payoff that won't be undertaken by the private sector. Recent studies, such as the one by the Office of Technology Assessment, have estimated the potential incremental use of biomass stemming from these longer-term R&D efforts to be as much as 10 Quads/year by the year 2000.

Biomass Systems development can be conveniently divided into production R&D, which focuses on low-cost, efficient feedstock production and harvesting, and conversion R&D, which focuses on developing cost-effective means to convert the feedstock to energy or a more desirable fuel form.

The objective of biomass production R&D is to reduce price impacts created by an increasing demand for energy from biomass on agricultural and forest products. Biomass production activities in FY 1982 are aimed at reducing the costs and increasing the yields of biomass energy crops and include continuation of wood species selection and stand establishment, and development of production for arid and wetlands systems.

Major FY 1982 biomass conversion technology R&D activities include conducting final tests on selected gasification process development units and developing new thermochemical gasification and liquefaction concepts.

Research and Exploratory Development activities are long-term, high-risk research activities which, in FY 1982, include developing micro- and macro- algal cultivation systems, photochemical conversion systems, and new biochemical conversion concepts. In addition, Research and Exploratory Development activities provide the underlying exploratory research for new biomass energy concepts.

The FY 1982 funding for Systems Development and Research and exploratory Development are as follows:

a. Systems Development.....$8,300,000

- o Production ($3,500,000)
  Increase yields and decrease the costs of woody biomass by developing efficient short rotation energy farms. FY 1982 activities include the continuation of screening promising plant species, the identification of optimum management techniques and production measurements for short rotation coppice tree culture in different regions of the U.S. ($2,500,000)

  Develop biomass production systems that will reduce the need to use traditional farmland to produce biomass energy feedstocks. FY 1982 activities include identifying plant species and biomass production systems suitable for growth on marginal lands including arid lands ($1,000,000)

- Conversion ($4,800,000)
  Continue thermochemical conversion research and development for producing medium Btu gas from biomass feedstocks ($3,000,000)

  Continue research in catalyzed direct conversion of biomass to liquid fuels ($600,000)

  Continue research in fast pyrolysis techniques for converting biomass to liquid fuels ($600,000)

  Develop novel approaches to converting biomass energy to shaft power ($600,000)

b. Research and Exploratory Development.....$11,200,000

- Continue exploratory research and the development of new concepts for biochemical conversion. Develop innovative anaerobic and aerobic processes to convert recalcitrant biomass feedstocks into competitive energy products ($2,100,000)

- Determine yields and improve designs of land based microalgal and macroalgal cultivation systems. Develop harvesting methods for the cultivated algae and improve conversion systems to produce methane from macroalgae and chemicals from microalgae ($2,900,000)

- Continue experiments with photochemical conversion processes for increased efficiency and stability in the economic production of hydrogen. Develop integrated systems producing hydrogen from waste streams and using it on-site for chemical conversions ($1,400,000)

- Conduct exploratory research on non traditional energy crops to reduce impact created by increased use of biomass energy on agricultural and forest product prices and exploratory research on more efficient innovative thermochemical conversion concepts ($4,800,000)

c. Capital Equipment.....$1,000,000

Funds requested will provide for necessary instrumentation and test equipment to perform laboratory and field testing of research and development effort ($1,000,000)

Department of Energy
Biomass Energy Systems
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activity During FY 1981	Planned Activity During FY 1982
Production Systems Development	Initiate screening of tree species for regional energy farms, improve cultivation and harvesting methods.	Continue screening tree species and develop cultural treatments and production measurements of selected woody plants at original study sites.
	Develop water hyacinth wastewater treatment facilities and a prototype system for converting microalgae to oil.	Develop species and production systems for energy crops grown on arid and wetlands.
	Evaluate mechanized systems for producing and harvesting tropical grasses for use as boiler fuel.	
Conversion Systems Development	Continue tests of medium Btu gasification process development units (PDUs).	Construct fluid bed hydrogasification PDUs.
	Complete PDU scale liquefaction process based on existing technology.	Develop new thermochemical gasification and liquefaction concepts.
	Improve small scale, low Btu gasification technology.	
	Complete designs of "hole-in-the-ground" and one-time/day agitated crop residue degestors.	

Department of Energy
Biomass Energy Systems
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activity During FY 1981	Planned Activity During FY 1982
Research and Exploratory Development	Assess potential of developing land-based micro- and macro-algal energy production systems and select potential species for detailed study.	Determine yields and improve designs of land-based micro- and macro-algal cultivation systems.
	Initiate field studies and assess feasibility of cultivating hydrocarbon bearing plants.	Conduct exploratory research on innovative biomass production and conversion concepts.
	Assess the potential of producing chemicals from biomass.	Continue exploratory studies of new biochemical conversion concepts.

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Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Wind Energy Systems				
Planning, Management and Analysis.....	$ 5,540	$ 9,299	$ 9,299	$ 1,400
Wind Characteristics	4,862	6,016	6,016	2,500
Technology Development...	12,524	18,588	18,588	9,200
Engineering Development..	16,588	36,453	36,453	6,100
Implementation and Market Development.....	2,901	7,844	7,844	
TOTAL OPERATING EXPENSES	42,415	78,200	78,200	19,200
Congressional Adjustment..		5,500	5,500	
Capital Equipment.....	1,400	2,100	2,100	200
Construction.....	16,740	0	0	0
TOTAL BUDGET AUTHORITY	$60,555	$85,800*	$85,800	$19,400

*Rescission of $26,100,000 proposed by the new administration.

Authorization: P.L. 96-345--Wind Energy Act of 1980
Sec. 6, P.L. 93-473--Solar Energy Research and Development Act

Summary of Changes

FY 1981 Appropriation Enacted and FY 1982 Base.....	$85,800
Wind Energy Systems	
Program increases and decreases.	
Congressional Reduction.....	-5,500
Planning, Management and Analysis.....	-7,899
Wind Characteristics.....	-3,516
Technology Development.....	-9,388
Engineering Development.....	-30,353
Implementation and Market Development.....	-7,844
Capital Equipment.....	-1,900
FY 1982 Budget Request.....	$19,400

Wind Energy Systems.....$85,800,000.....$85,800,000.....$19,400,000

The principal emphasis in FY 1982 will be on research in high risk, potentially high payoff areas and on collection of wind resource and wind machine performance and reliability data for use by the emerging wind machine manufacturing and user communities.

The MOD-0 test bed will continue to be operated for experimental evaluation of new components and verification of theories predicted by analytical research. Operational experiments on the MOD-0A's and MOD-1 will continue in cooperation with the host utilities. Initial evaluation of the second generation MOD-2 three-machine cluster will be underway, also in cooperation with the host utility. The purpose of these activities will be to provide the data and modifications, as required, that will permit the local utility to assume ownership and operational control of the machines when technical reliability is achieved.

Research on promising wind machine concepts will be continued and for small wind systems (under 100 kW), the Rocky Flats test center will develop performance, reliability, maintenance, and other operational data. Testing on a customer cost basis will also be provided for privately developed experimental prototypes. The test center is the only practical source of such information for developers and manufacturers and enables them to undertake necessary improvements using private funds.

Expansion of wind energy generating capacity can be achieved with a strong commitment in the private sector to develop cost effective wind systems and to invest in factory facilities and marketing networks. There are indications that such actions are being contemplated and initiated. To promote this, studies of wind machine performance and economics will be undertaken for major application areas. These findings support private investor decisions to commercialize available technology. Wind resource siting methodologies will be developed to allow rapid identification of high potential wind sites. This information helps potential wind system users make their own decisions about machine purchases.

The FY 1982 request is made in recognition of: (1) an emerging wind systems manufacturing industry, (2) an increased awareness and interest on the part of potential machine purchasers, and (3) an anticipated rapid growth of the wind industry prompted, in part, by rising conventional energy prices and tax incentives provided for renewable energy sources.

The FY 1982 funding request for each program element is as follows:

a. Planning Manaement, and Analysis.....$1,400,000

- o Conduct mission analyses and technology assessments for major application areas.
- o Develop an understanding of the factors influencing economics and applications of wind systems in major application sectors.
- o Conduct analytical studies on television interference and noise for small machines.

b. Wind Characteristics.....$2,500,000

- o Refine wind energy prospecting techniques and publish results.
- o Perform modeling research on wind characteristics that will lead to accurate wind forecasting.

c. Technology Development.....$9,200,000

- o Test prototype systems and obtain performance, reliability, loads and maintenance information at the Small Systems Test Center at Rocky Flats, Colorado.
- o Conduct research and testing of blades and other advanced components leading to lower cost and improved performance and lifetime, and transfer technology to industry.
- o Develop and refine analytical tools for the structural, aerodynamic, and performance evaluation of advanced systems by industry.
- o Conduct research on innovative wind machine concepts.

d. Engineering Development.....$6,100,000

- o Conduct operational experiments on advanced technology small machines in size ranges from 1 kW to 40 kW.
- o Conduct operational experiments on MOD-0A, MOD-1, and MOD-2 machines to develop data on blade fatigue, machine stress, machine interactions, and tower resonance.

e. Capital Equipment.....$ 200,000

- o Provide test and analytical equipment to support noise and television interference research and field experiments.

Department of Energy
Wind Energy Systems
FY 1982 Congressional Budget Request
Key Activity Summary

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Planning, Management Analysis	Initial economic analyses, and applications studies were undertaken. Mod-1 noise/TVI effects analyzed.	Applications studies will be performed. Noise/TVI effects from small and large systems undertaken.
Wind Characterization	Complete 1st edition of U.S. wind atlases. Complete installation of 300 ft. measurement towers at 35 utility company sites.	Continue research on wind forecasting and siting methodologies.
Technology Development	Test small wind systems at Rocky Flats and the DOT Pueblo test sites. Test components on Mod-0 and other test systems.	Continue testing experimental systems. Perform accelerated fatigue testing to determine blade lifetimes. Examine potential of innovative systems for urban use.
Engineering Development	Complete installation and initial testing of 3 unit Mod 2 cluster. Complete development of 4 and 15 kW small systems. Complete concept design on Mod 5 systems.	Collect data on small systems and on Mod-0A, Mod-1, and Mod-2 machines.

Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars.)

Ocean Energy Systems	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Management Planning and Analysis	$ 7,609	$ 9,360	$ 9,360	$ 0
Technology Development	8,908	10,600	10,600	0
Engineering Test & Evaluation	11,846	15,820	15,820	0
Advanced R&D	3,237	2,520	2,520	0
TOTAL OPERATING EXPENSES	31,600	38,300	38,300	0
Capital Equipment	700	700	700	0
Construction	10,700			
TOTAL BUDGET AUTHORITY	$43,000	$39,000*	$39,000	$ 0

*Rescission of $4,400,000 is proposed by the new administration.

Authorizaton: Sec. 6; P.L. 93-473--Solar Energy Research and Development Act

No funds requested for FY 1982 because:

- Technical feasibility of OTEC technology was established by operation of mini-OTEC;
- Program has completed several years of component development including testing of heat exchangers on OTEC-1 facility;
- Studies have indicated that OTEC is cost-competitive today in island markets.

Therefore, further development in commercialization of this technology can be undertaken by the private sector.

Solar Information Systems	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Operating Expenses	$ 0	$ 1,400	$ 1,400	$ 6,700
Total Operating Expenses	$ 0	$ 1,400	$ 1,400	$ 6,700

Authorization: Section 8, Public Law 93-473
Solar Energy Research and Development Act

Summary of Changes

FY 1981 Appropriation enacted and FY 1982 base	$ 1,400
Consolidate and focus conservation and solar energy information efforts which include preparing and disseminating information products, developing data bases and handling inquiries and referrals. The Solar Energy Information Data Bank (SEIDB) was funded directly from the other solar line items in FY 1981 (about 95% of the change between FY 1981 and FY 1982) and new work to improve effectiveness of DOE and other Federal agency information program activities as required by the Energy Security Act (about 5% of the change between FY 1981 and FY 1982)	5,300
FY 1982 Budget Request	$ 6,700

Program Objectives

The overall objective of the Solar Information System Program is to develop an integrated national network that efficiently transfers relevant solar energy technical information to energy decision makers.

Prior to FY 1982 the central thrust of this program has been the development of the Solar Energy Information Data Bank (SEIDB). The SEIDB was initiated in FY 1979 and operated in FY 1980 and FY 1981 as a national network with the direct participation of the Regional Solar Energy Centers (RSECs) and the National Solar Heating and Cooling Information Center (NSHCIC) and close coordination with DOE information activities, particularly the Energy Information Administration (EIA) and the Technical Information Center (TIC). Liaison with other appropriate Federal information activities is also maintained to maximize utilization of existing information and data and minimize duplication.

With the SEIDB, there is cost effective access to solar energy information. The establishment of a comprehensive data retrieval and dissemination service with central coordination greatly facilitates information transfer among national, state, and local levels, and between the public and private sector.

Funding for SEIDB in FY 1979 and FY 1980 was provided completely from overall solar operating funds. Separate funding was requested in FY 1981 for partial SEIDB activities, $1.4M, with the balance $7.6M provided from solar operating funds. The FY 1982 budget request reflects the total estimated Solar Information System Program operating expenses required to accomplish information, coordination, and integration activities.

Prior Years Efforts

The SEIDB provides three basic information services:

	FY 1981
o Data Base Development - Automated Information Files	
- Data Bases Developed	9

Bibliographic, Calendar, Models, Manufacturers, Legislation, International, Education, Installation, Insolation

- Data Base Records Developed	32,000
o Inquiry and Referral - Telephone and Mail Answer Service	
- Inquiries Answered	400,000
- Documents Collected	8,000
- Documents Mailed	4,000,000
- Number of Users (on-line)	20,000

o Information Collection and Dissemination - Information Products

- Education Directories
- Manufacturers Directories
- Solar Events
- Vocational Training Directory
- Technical Reports Bulletins
- Information Locator
- Data Bank Training Bulletins
- Insolation Data Directories

Critical to the rapid, widespread adoption of solar energy is the deliberate development of systems for funneling the results of federal research and development to the private sector. For example: scientists need the latest solar research results to enhance their own efforts; utilities, engineers and installers need performance data to design and install solar systems; potential owners of solar energy systems need cost information to make purchase decisions; manufacturers need materials data to improve product lines.

Consistent with this objective the SEIDB has completed work to: (1) Define and prioritize solar information users; and (2) to determine the near-term information and the channels used to reach such users.

FY 1982 Activities

During FY 1982, the data base and information activities will be directed to providing products resulting from this user needs process.

Data Base Development

The existing nine data bases will be reduced to six or seven having the most value to manufacturers, utilities, and the financial planners. Limited development of new data bases will be undertaken to meet demands for cost and tax incentive information.

Inquiry and Referral

General inquiry services will be redirected towards providing factual information and literature searches for those technologies designated for phasing into private sector leadership.

Data Collection and Dissemination

Information collection activities based on prioritization studies will emphasize directories, physical resource data, and technology characterization and costs of wind and photovoltaics technologies. Solar and Ocean Thermal information activities will collect results of current field experiments for dissemination to power producers.

Coordination and Integration

The SEIDB is now operational, and has proven its ability to support effectively the information management process, therefore, the current emphasis of the Solar Information System Program is one of continuing to manage the SEIDB network, but with an ultimate goal of optimizing the use of the resources of DOE and other Federal agencies in addressing the information transfer function through proper coordination activities. These coordination and integration activities involve the development and articulation of policy related to information gathering, packaging, and dissemination conducted within DOE. The resulting policies and procedures are then presented to interagency information working groups for their consideration and adoption as an important part of an overall effort to coordinate and integrate Federal energy information activities.

Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
Solar Energy
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Solar Energy Research Institute Facility				
Operating Expenses	$ 6,900	$ 5,000	$ 5,000	$ 0
Total solar energy research institute facility	$ 6,900	$ 5,000	$ 5,000	$ 0

Authorization: Section 10, Public Law 93-473, Solar Energy Research Development and Demonstration Act of 1974.

Summary of Changes

FY 1981 Appropriation enacted and FY 1982 base	$ 5,000
Solar Energy Research Institute	
Defer Title I and Title II Design beyond FY 1982	$ -5,000
FY 1982 Budget Request	$ 0

This line item was established to evaluate and, if appropriate provide permanent facilities for SERI, which is currently housed in leased space.

Given the redirection of the DOE solar program undertaken by the new administration, SERI's current mission and staffing levels are likely to change. Until a new mission, staffing level, and facility requirements for SERI are established, it would be unwise to continue with design and construction of a permanent facility that is based on an outdated mission for this organization.

Therefore, no funding for a permanent facility is requested in FY 1982, because these underlining issues regarding the organization itself are not yet answered. Once SERI's new mission is defined and an appropriate staffing level agreed upon, it will be possible to evaluate whether SERI could best be served on a cost-effective basis by construction of a permanent facility.

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Energy Supply Research and Development - Plant and Capital Equipment
Solar Energy
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981[1/] Appropriation	FY 1982 Base	FY 1982[2/] Request
Solar International Activities (CS)				
Operating Expenses	$ 0	$ 12,000	$ 12,000	$ 4,000
Total, solar international activities	$ 0	$ 12,000	$ 12,000	$ 4,000

Authorization: Section 22, Public Law 93-473, The Solar Energy Research, Development and Demonstration Act of 1974

Summary of Changes

FY 1981 Appropriation enacted and FY 1982 base	$ 12,000
Solar International Activities	
This is a reduction in funding for the Saudi Arabia and Italian Cooperative Agreements	(8,000)
FY 1982 Budget Request	$ 4,000

The FY 1982 international line-item of $4M will be used to fund the projects in the U.S.-Saudi Arabia solar agreement. Some of the critical milestone items are:

- o Initiate operational tests of four advanced solar cooling installations in commercial buildings in the U.S. Southwest.
- o Review detailed designs, and initiate construction of two solar desalination systems. (SOLERAS)
- o Complete construction and initiate operational tests of the 350 kWe photovoltaic village power system. (SOLERAS)

1/ Funding was also provided from the domestic Solar Technology programs to complete FY 1981 requirement for the Saudi Arabia agreement and to support all other bilateral agreements and SERI International activities.

2/ Funds requested in FY 1982 under the domestic Solar Energy program may be used to support Market Development Activities and Bilateral agreements.

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Solar Energy
Energy Supply Research & Development - Operating Expenses
Energy Supply Research & Development - Capital Equipment & Construction
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars)

	FY 1980 APPROPRIATION	FY 1981 APPROPRIATION	FY 1982 BASE	FY 1982 REQUEST
Program Direction				
Operating Expense	6,029	6,786	6,786	4,000
TOTAL PROGRAM DIRECTION	6,029	6,786	6,786	4,000

Authorization: Sec. 5-17; P.L. 93-473 Solar Energy Research and Development Act

FY 1981 Appropriation Enacted	$ 6,786
FY 1982 Base	6,786
Program increases and decreases	
Personnel reduction	- 2,786
FY 1982 Budget Request	4,000

The personnel assigned to the Solar Energy program develop the overall strategies, plans, resource requirements, and provide the integrated program management necessary to conduct the research and development of the various solar technologies. The expertise required to perform these management and technical functions consists of a broad base of skills including backgrounds in research and development, engineering, manufacturing, planning, and executive administration.

The FY 1982 staffing for Energy Supply Research and Development Appropriation is 98 FTP (123 staff equivalent). In order to utilize better the personnel resources available to DOE, a policy of decentralization has been adopted which allows for the day-to-day managerial activities to be delegated to DOE field offices, and key technology centers. This concept strengthens the working relationships between Headquarters and the field agencies; improves the overall management and utilization of key federal personnel; and provides contractors ready access to cognizant federal managers.

The headquarters' responsibilities include broad technical management which is required for the integration of complex research and development programs. These responsibilities include the establishment of performance criteria, the assessment of technical performance, milestone progress, cost controls, procurement strategy and planning, as well as both short- and long-term program planning. Executive administration is also required in terms of budgeting, report analysis, development of management agreements, and coordination of contract activities.

Execution of the solar program currently requires the management of a significant number of contracts and the attendant programmatic activity of continued review and assessment. Interface is maintained with a large number of federal agencies such as NASA, NBS, DOD, GSA, HHS, and HUD to assist in the implementation of the program. Likewise, extensive interface is also maintained with the DOE laboratories, international agencies, and operations offices in the execution of the program; over 1,000 procurement packages are issued annually resulting in modifications to existing contracts or the issuance of new controls. Over 500 unsolicited proposals are reviewed annually as well as participation in the review of numerous formal solicitations. The office workload also consists of preparation of Annual Operating Plans, institutional planning documents, participation in various working groups convened by the Secretary or other DOE management officials, as well as responding to the more routine office requirements such as: incoming telephone calls; congressional and other mail; and meetings with office visitors. Also staff time has to be made available for participation in workshops, conferences, and meetings with professional societies, state and local governments, industry, and the public to promote solar energy utilization.

Energy Supply Research and Development-Operating Expenses
Solar Technology
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Alcohol Fuels (AF)				
Technology Development and Utilization:				
Operating Expenses	$12,000	$12,025	$12,025	$9,550
Construction	2,000	2,500		
Subtotal	14,000	$14,525		
Market Development:				
Operating Expenses	5,000	5,680	5,680	0
Management and Program Control:				
Operating Expenses	3,000	2,120	2,120	200
Program Direction	0	975	975	250
Total:				
Operating Expenses	20,000	20,800	20,800	10,000
Construction	2,000	2,500		
Total Alcohol Fuels	$22,000	$23,300*	$20,800	10,000

Authorization: P.L. 93-577

*Does not reflect $2,500 appropriated for the Ethanol from Biomass facility, or $2,800 in operating costs which are being proposed for rescission by the Administration.

Summary of Changes

FY 1981 Appropriations enacted and FY 1981 base..... $23,300

Alcohol Fuels

Program Increases and Decreases:

Technology Development and Utilization:

Capacity Expansion and Retrofit	-450
Process Technology	-1,575
Research and Development	-850
Utilization Development	+400

Market Development:

Information, Liaison and Public Response	-880
Vocation and Education Programs	-500
Alcohol Fuels Technology Grants	-1,500

Management and Program Control: .....-1,920

Program Direction ..... -725

Rescission Requests

Construction	-2,500
Operating Expenses	-2,800

FY 1982 Budget Request $10,000

ALCOHOL: A DOMESTIC RENEWABLE ENERGY RESOURCE

Alcohol from biomass can be an important alternate energy source. Alcohol fuels appear to be an inherently better fuel than gasoline if engine systems are designed to capture this advantage. The fuel resource base, both renewable and fossil, would be greatly extended.

Technologies to convert sugars and starches to fuel alcohol are adequately developed to date to obviate the need for government support. Still, there are technologies under development, principally cellulosic conversion to ethanol or methanol, which offer long-term promise for increased renewable fuel production.

The alcohol program seeks to develop process technology for producing alcohol fuels from non-food resources, principally cellulosics and to establish proof of concept of advanced alcohol engine systems of very high fuel efficiency.

The goals of the Office of Alcohol Fuels are:

- o development of cellulosic conversion technologies to achieve their economic feasibility thus encouraging private commercialization and providing a renewable energy source capable of providing a significant percentage of our nations liquid fuel needs.
- o Responding to all Executive and Legislative reporting requirements in a timely and effective manner.

STRATEGY

To accomplish these goals, the strategy of the Office of Alcohol Fuels is focused on mid to long term novel, high risk and high pay off technologies that utilize potentially low cost and widely available cellulosic feedstocks (e.g. wood, crop residues, garbage) and other biomass feedstocks which will lower alcohol production costs and increase the net energy balance in an environmental safe manner using non food feedstocks.

The R&D program will conduct basic and applied research in on conversion processes to produce alcohol and small scale proof of concept tests. Strong liaison is established between DOE sponsored R&D and industry to foster technology transfer to industrial pilot plant demonstrations.

Major accomplishments completed by or anticipated in FY 81 includes:

Technology Development and Utilization:

- o Designed, constructed, operated and tested a small-scale ethanol still producing 25 gallons per day. Written draft design and operating manuals for public and industry use.
- o Designed, constructed, operated and tested a farm size still. Written draft designed and operating manuals for public and industry use.
- o Initiated evaluation of various dehydration process.
- o Designed, constructed, operated and tested bench scale process development units of promising process technologies in lignocellulosic conversion.
- o Awarded over 130 grants to promote innovation and new technologies totaling $1.6 million.
- o Tested blended alcohol in diesel engines.
- o Developed detailed program to test neat ethanol and methanol engines.
- o Prepared various Environmental, Health, Safety, compliance reports - NEPA compliance test and documentation, generic health and safety report.
- o Prepared Environmental R&D plan and Development Plan.

Management and Program Control

Office of Alcohol Fuels established;

- o Prepared and submitted quarterly reports to Congress, Annual report, US DOE/USDA joint Biomass Development Plan, Alcohol Fuels in transportation report and others.
- o Collected and analyzed alcohol production and use data by cost, type of fuel, and end use to assess programs performance.
- o Monitored programs, contract, grants.

Technology, Development, and Utilization $14,000 $14,525 $9,550

The Technology Development and Utilization subprogram is responsible for conducting the alcohol R&D program. It has two major units:

(1) Process Technology and Development
(2) Utilization Development

1) Process Technology and Development $12,000 $10,125 $8550

The Process Technology unit is responsible for the R&D in production of alcohol. The major objectives are decreasing production costs increasing net energy production and decreasing the use of food grains as a feedstock. The unit will focus on both ethanol and methanol alcohol fuels from biomass, primarily cellulosic feedstocks.

In ethanol production the R&D focus will be on process integration of the following components because improvement in these areas are crucial to more efficient and cost competitive alcohol production.

- o Pretreatment Options Assessment
  - steam explosion
  - solvent delignification
- o Acid Hydrolysis
  - Fast reaction systems
  - Improved yeild
- o Enzymatic Hydrolysis
  - High cellulase enzyme producers
  - Thermophylic organisms
  - Single organisms for simultaneous hydrolysis and fermentation
- o Fermentation
  - high temperature
  - mid temperature
- o Energy Efficient Separation
  - membrane separation
  - vaporphose adsorption
  - adsorption
  - extraction
- o By-Product Assessment
  - Process gases
  - Lignin
  - C_5 Sugars

In Methanol, the focus will be on:

- o Gasification (biomass)
  - Oxygen Gasifier
  - Fast Pyrolysis
- o Catalysis

These activities include laboratory and theoretical investigations, and field experimentation at the process development unit and proof of concept levels. The R&D tasks will focus on defined needs for a broad set of known but not matured conversion processes and on exploratory questions concerning several processes that are only conceptual.

During FY 1982, bench-scale construction operation and testing will be done to confirm process design and operating parameters for those process technologies selected for accelerated development under the FY 1981 program. Several additional process technologies will be selected for accelerated development up through the design of test units. Information derived from process development unit testing will be used as the basis for initiating pilot engineering design. An industrial liaison program will continue to provide results and insure early commercial demonstration of production process technologies developed.

2) Utilization Development.....$600 $600 $1,000

The utilization development activity will conduct R&D to resolve strategically important questions related to the use of alcohols (ethanol and methanol) for surface transportation. Focus will be on advanced, neat (100%) alcohol engine systems, such as, dissociated-alcohol fueled internal combustion engines which are likely feasible with alcohols but not with gasoline. Such systems promise more than double the fuel efficiency of conventional gasoline internal.combustion engines. This is above the savings available through reduced automobile size and improved design.

Specific objectives of activities in this subprogram element will include:

- o Proof of concept demonstration of high efficiency engine systems operating on neat alcohols.
- o Evaluation of the advantages of methanol versus ethanol.
- o Assessment of storage and distribution problems and examination of possible solutions.
- o Assessment of high efficiency internal combustion engines operating on neat alcohol fuels.
- o Dissemination of engine design and testing information.

Areas of work include determining optimum performance parameters for various qualities of the alcohols (proof), stability problems peculiar to alcohols, new lubricant requirements, exhaust and evaporative emissions, and corrosion and storage characteristics. The focus will be on high performance, high compression engines that operate at high efficiencies. These engines will take maximum advantage of the very high octane rating inherent in alcohol fuels. Several designs will be obtained and evaluated, with the most promising being selected for full vehicle system evaluation. Emission characterization will be an integral part of the program.

Management and Program Control	$3,000	$2,120	$200

This activity prepares the annual program plan, conducts bimonthly project reviews, prepares briefing materials, analyzes policy options and impacts (especially economic and environmental), evaluates programs and maintains Alcohol Fuel's production data bases.

This unit also collects and analyzes alcohol production data by state, volume and cost and alcohol usage data by state, volume and use.

Program Direction	$ 0	$975	$250

This program activity provides funds for all office of Alcohol Fuels employees. It includes salaries, travel, and benefits. The FY 1982 program direction is for 5 FTE's.

Department of Energy
FY 1982 Congressional Budget Request

Key Activity Summary

Energy Conversion and Utilization Technology

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Stratified-charge engine technology	Conduct research and experiments leading to data required to verify intake process computer models.	Conduct research effort leading to verification of analyses of intake, fuel preparation, and exhaust processes.
Diesel engine technology	Complete preparations for single-diesel cylinder experiments.	Conduct experiments; develop analysis techniques.
	Conduct research efforts directed at demonstration of in-cylinder diesel particulate formation mechanisms.	Develop and verify analyses of diesel emissions processes.
Heat exchangers technologies	Research into heat exchanger designs to overcome problems of flow-induced vibration in shell & tube heat exchangers.	Research into methods for low-cost manufacturing of spirally fluted, enhanced-performance heat exchanger tubes.
	Development and dissemination of a validated computerized heat exchanger network optimization algorithm.	Aluminized coatings for low-cost metallic heat exchangers.
Chemical processes technology	Exploratory development of biochemical process technology for the production of chemical feedstocks from agricultural wastes.	Research into heterogeneously catalyzed selective conversion of coal/biomass-derived synthetic gas into high yields of low molecular weight chemical feedstocks.
	Research to increase stability of catalyst supports used in production of ammonia fertilizers.	Exploratory development of a low-energy process for production of cement.

Key Activity	Estimated Activities During FY 1981	Planned Activities During FY 1982
Cycles technologies	Identify technology needs and assess relative importance of component constraints for free-piston and for large kinematic Stirling engine concepts. Included will be investigation of problems associated with combustor designs for multifuel use.	Continue efforts initiated in FY 1981.
	Initiate research activities to examine feasibilities of advanced Stirling engine concepts and component processes.	Increased emphasis will be directed to understand heat flow and transfer aspects common to Stirling cycles; analytical techniques will be developed and appropriate experiments will be conducted.
Stirling engines technologies	Research efforts will be initiated to examine potential of selected methods for increasing reliability and overall cycle performance.	Continue effort initiated in FY 1981.
	Advanced configuration will be examined and applicable cycle analyses will be performed to evaluate relevant engine concept improvements.	Assess the feasibility of developing a third generation Stirling engine concept.
Automotive engine materials technologies	Assessment of materials requirements of light-duty adiabatic diesel engines (ADE).	Research on bonding of zirconia coatings to metal for ADE piston heads.
	Long-range ordered alloys for high-temperature engines.	Research into improved methods of non-destructive testing for ceramic engine components.
Residential and commercial furnaces technologies	Develop fuel-dependent analysis techniques and experiments that will be used to examine combustion process differences relative to alternative fuels.	Continue efforts initiated in FY 1981.
		Initiate research on advanced concepts for use of alternative fuel without compromise of performance and environmental impact.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

GEOTHERMAL

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GEOTHERMAL

The purpose of the Geothermal Program is to support commercial development and utilization of the nation's geothermal resources as economic, reliable, and environmentally acceptable energy sources for electrical power generation, for direct heat applications, and for thermal energy and methane recovery from geopressured resources.

Installed electric power capacities of 3,000 MWe and 0.04 Quads of direct heat applicattions by 1985 are achievable with this Federal program. Market penetration analysis shows that the probable (50 percent probability) market share in the year 2000 with this Federal program, will be at least 5,800 MWe electrical power capacity and 0.18 Quads direct heat applications from hydrothermal resources. The Federal program also supports the determination by 1986 of the engineering and economic feasibility of recovering methane, thermal and hydraulic energy from geopressured resources and thermal energy from hot dry rock resources.

The major objectives of the program are to: (1) support hydrothermal utilization by removing technological and environmental constraints; (2) evaluate the technical and economic recoverability of methane, and hydraulic and thermal energy from geopressured resources; (3) determine the technical and economic feasibility of heat extraction from hot dry rock resources; and (4) develop the technologies to reduce the cost of energy recovery from all geothermal resources.

The strategy of the Geothermal Program is to support private sector development of U.S. geothermal resources by primarily removing technological barriers to development. The basic assumption is that U.S. industry will develop all types of geothermal resources if the government provides initial assistance to resolve technical problems and economic questions, and institutional issues that are uniquely geothermal and novel to U.S. industry. The strategy emphasizes actions required to support the development of geothermal resource types for which the technology and economics have not been proven.

The approach includes regulatory reform, cost-shared demonstration, technology development, and information dissemination. Federal program requirements are a small but extremely important part of the total investment that will eventually be required to realize the ultimate potential of the very large geothermal resource base.

The Raft River Binary Pilot Plant project is a pioneering effort to explore the potential for using moderate temperature (150°C) hydrothermal resources for generating electric power. This effort supports eventual commercial use of low-and moderate-temperature reresources. The 50 MWe cost-shared flash-steam demonstration facility in New Mexico will provide technical and financial data for all parties interested in generating electricity from moderate-and high-temperature liquid-dominated hydrothermal resources.

The geopressured resource program will continue the initiative taken earlier to establish the technical and economic feasibility of exploiting geopressured resources. The broad range of uncertainty in the amount of recoverable geopressured methane is being substantially reduced as tests of new and existing wells define geopressured reservoir characteristics. The estimated geopressured methane resource base, 3,000-50,000 quads, will be better assessed, and energy recovery estimates will be refined.

The hot dry rock (HDR) program will focus on the problem of establishing the technology for thermal energy extraction. The basic technical and economic feasibility of the extraction technology will be established by constructing and operating a 20-50 MWt loop at the Fenton Hill, New Mexico, project site.

Technology development will continue to be directed toward cost reduction in areas critical for exploitation of geothermal resources. Improved downhole materials, such as high-temperature muds and seals will be in commercial geothermal service in the early to mid-1980's. Development of well stimulation techniques will increase production from marginal wells, and thus improve the economics of geothermal field development. Other technology developments will include binary conversion systems to allow exploitation of the large moderate temperature hydrothermal resource. Efforts in the geosciences will concentrate on new techniques for locating resources and for evaluating the lifetime and productivity of reservoirs.

FY 1980/1981 Accomplishments

- A market penetration analysis for hydrothermal resources has shown the extent to which the private sector will develop these resources with and without Federal incentives.

- State development planning efforts in 15 western states will be completed, having successfully identified and stimulated private sector interest in over 100 projects.

- The Geothermal Progress Monitor system was established and will now provide early indications of success or shortfall in industry development.

- Support of the Interagency Geothermal Coordinating Council resulted in Congressional initiatives that provide enhanced tax incentives and regulatory exemptions for geothermal projects.

- The National Conference of State Legislatures participated in 41 state legislative workshops which led to the introduction of 58 geothermal bills by 12 state legislatures. Work will continue in four to six additional states.

- Nineteen technical and economic feasibility studies of direct heat applications have identified prospective non-electric users co-located with low- to moderate-temperature hydrothermal reservoirs.

- A total of 12 direct heat demonstration projects are expected to become operational.

- The Raft River, Idaho, 5 MWe plant will be completed and the plant turned over to a utility group.

FY 1982 Expected Accomplishments

- Continued support of the Interagency Geothermal Coordinating Council, including the preparation of the Annual Report to Congress, the Federal Geothermal Program Plan, and quarterly Progress Monitor Reports.

- An environmental assessment of the impact of withdrawing geothermal fluids will be completed.

- The 50 MWe geothermal flash-steam power plant at Baca, New Mexico, will be completed and ready for shakedown testing.

- Monitoring and evaluation will continue at the 3 MWe wellhead generator in the Puna District of Hawaii. Feasibility of this type of system should be established so the private sector can pursue development.

- Additional geopressured wells-of-opportunity will be completed and tested to better define the magnitude and nature of this resource.

- An additional design well and continued testing of existing wells will provide a preliminary conclusion concerning the of the geopressured reservoirs.

- Fracturing experiments with the 20-50 MWt hot dry rock thermal loop system at Fenton Hill, New Mexico and the construction of surface equipment will set the stage for full-scale testing in FY 1983.

- Several high priority components (drilling equipment, conversion equipment, and downhole pumps) will be developed and field tested.

- Results of well stimulation in high temperature wells will be available.

- Preliminary results will be available on high priority geosciences technology developments.

The annual contribution from hydrothermal geothermal resources will reach 5,800 MW of electric power production and 0.18 quads of thermal energy for direct heat applications by the year 2000. This useful energy production, however, does not measure the full benefit. In addition to its potential for reducing oil imports, geothermal is an environmentally benign energy source; it is a dispersed small-scale energy source and it can have significant economic benefit for rural areas, which is where the resource is often located.

The benefits from the geopressured program are harder to define because there is no firm basis for estimating future production. However, given the potential economically recoverable resource of from 300 to 5,000 quads and the fact that the fuel form (methane) is so desirable, it is in the national interest to evaluate the resource as soon as possible. The current program is expected to demonstrate this by 1986.

The benefits of the hot dry rock program are also hard to quantify. Again, the tremendous magnitude of the resource justifies research and development to determine the technical and economic feasibility of using this resource. The fact that Germany and Japan are cost-sharing our research confirms the observation that hot dry rock has significant long term potential.

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Geothermal
Energy Supply Research and Development- Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Geothermal				
Hydrothermal industrialization				
Operating expenses	$45,150	$49,024	$49,024	$2,124
Capital equipment	800	0	0	0
Plant	24,450	18,911	18,911	3,876
Subtotal	70,400	67,935	67,935	6,000
Geopressured resources				
Operating expenses	35,700	35,600	35,600	20,336
Capital equipment	300	200	200	0
Subtotal	36,000	35,800	35,800	20,336
Geothermal Technology Development				
Hot dry rock program				
Operating expenses	14,000	13,500	13,500	9,700
Capital equipment	1,000	500	500	300
Subtotal	15,000	14,000	14,000	10,000
Component development				
Operating expenses	24,900	35,300	35,300	9,876
Capital equipment	1,100	610	610	563
Subtotal	26,000	35,910	35,910	10,439
Program direction				
Operating expenses	1,802	2,376	2,376	1,600
Subtotal	1,802	2,376	2,376	1,600
Total				
Operating expenses	121,552	135,800	135,800	43,636
Capital equipment	3,200	1,310	1,310	863
Plant	24,450	18,911	18,911	3,876
Geothermal	$149,202	$156,021 *	$156,021	$48,375

* Proposed rescission will reduce the FY 1981 appropriation by $13,500,000.

Authorization: P.L. 93-410

Summary of Changes

Energy Supply Research and Development
(dollars in thousands)

FY 1981 Appropriation enacted		$ 156,021
Built in increases and decreases:		
Pay cost supplemental		+ 0
FY 1982 base		$ 156,021
Program increases and decreases:		
Hydrothermal industrialization		
o Planning and analysis		- 6,081
o Private sector development		- 2,378
o Resource definition - termination		- 21,224
- National resource assessment	-185	
- State-coupled assessment	- 9,909	
- Industry-coupled case studies	- 530	
- User-coupled confirmation drilling	-10,600	
o Non electric demonstrations - termination		- 11,500
o Environmental control - now budgeted in component development		- 2,600
o 50 MWe Flash steam demonstration plant, Valles Caldera, NM		- 6,050
o 50 MWe Binary demonstration plant, Heber, CA		- 8,000
o 5 MWe Raft River pilot plant, Malta, ID		- 3,702
o Geothermal component test facility, East Mesa, CA		- 400
Subtotal		$- 61,935
Geopressured resources		
o Reduce design well activity		- 14,426
o Reduce supporting R&D		- 1,038
Subtotal		$- 15,464
Geothermal technology development		
o Hot dry rock program		$- 4,000

Energy Supply Research and Development
(dollars in thousands)

o Component development	
- Drilling technology	- 7,211
- Energy conversion	- 8,318
- Reservoir stimulation	- 1,300
- Geochemical engineering and materials	- 4,095
- Geoscience technology	- 5,047
- Environmental control - budgeted previously in Hydrothermal industrialization	+ 500
Subtotal	$- 25,471
Program direction	
o decrease of 26 staff years	- 776
Subtotal	$- 776
FY 1982 request	$ 48,375

Hydrothermal Industrialization

FY 81 Appropriation	FY 82 Base	FY 82 Request
$67,935	$67,935	$6,000

Planning and Analysis

No funds are being requested for Planning and Analysis, a $6,081,000 decrease from the FY 1981 appropriation. This reduction in Federal support reflects a significant redirection of the thrust of the geothermal program toward greater reliance on the states and private sector for short term development and hydrothermal commercialization Thus, planning and analysis to support the short term commercialization activity is being phased out.

Continued support in FY 1982 for the Interagency Geothermal Coordinating Council (IGCC) is essential for Federal agency cooperative planning and the implementation of barrier mitigation activities. As part of DOE's leadership role in the IGCC, the progress of geothermal development is monitored and information is disseminated to other government agencies and to the private sector. Such information is important for assessing the success or failure of the Federal program. The Interagency Geothermal Council and Progress Monitor will be supported by in-house staff.

The jointly funded Federal-State commercialization planning in 15 western states and two eastern states will be phased out in FY 1981. These Federally-supported planning efforts provide a solid foundation for continued geothermal development planning by the States in FY 1982 and following years.

Private Sector Development

No funds are being requested for FY 1982. This is a decrease of $2,378,000 from the FY 1981 budget. This phase out reflects the substantial progress in accelerating development of hydrothermal energy during the last two years, resulting in an industrial base that can be self-supporting in future years.

Resource Definition

The Resource Definition Program, funded at $21,224,000 in 1981, is being terminated in FY 1982, and no funding is requested based on the assumption that these activities be will assumed by the USGS, the states and the private sector as appropriate.

The Resource Definition activity confirms the existence of hydrothermal reservoirs, which is the initial phase of bringing hydrothermal energy on line. The activities to meet this goal are: (1) evaluate the resource potential of the U.S. and establish the geographic distribution of the resource; (2) confirm the existence and commercial potential of high-temperature reservoirs suitable for electrical power generation; and, (3) confirm low- and moderate-temperature reservoirs for direct-heat applications. In achieving these objectives, DOE worked with the U.S. Geological Survey (USGS) in performing national and regional resource assessments; with private sector resource developers in confirming of high-temperature reservoirs with near-term commercial potential (Industry-Coupled Reservoir Confirmation); and with individual states in targeting low- and moderate-temperature reservoirs in which existing resource developers currently have little interest (State-Coupled Assessment). In addition, a user-coupled activity to assist in the confirmation of low- and moderate-temperature reservoirs that could supply the needs of specific direct heat users was introduced.

Nonelectric Field Experiments

No funds are requested for nonelectric demonstrations in FY 1982. This is a decrease of $11,500,000 from the FY 1981 level, and shifts responsibility this activity to the private sector.

The objective of this activity is to demonstrate technical and economic viability of direct use of hydrothermal energy in actual field projects to provide operational engineering and economic data, and to provide experience for the local resource and engineering firms which are expected to constitute the business base for private sector development.

Twenty-four projects were initiated in FY 1979 and FY 1980. Suitable resources and favorable economics have so far been confirmed for 15 of these projects, reservoir confirmation is still underway for six other projects, and three projects failed to find resources suitable for the intended use.

Although individual projects run for two to five years, funding has been authorized on an annual basis as projects developed. Funding through FY 1981 will allow for completion of seventeen projects. No further Federal support will be provided for the remaining seven projects. With energy prices increasing and the Federal support already provided to these projects, it has been concluded that these projects are sufficiently economic to justify an end to Federal support. Technical problems in implementing projects are judged to be within the ability of the private sector to solve.

Environmental Control Technology

This program was previously funded in the Hydrothermal Industrialization budget category. For FY 1982, Environmental Control Technology will be budgeted in the Component Development category.

50 MWe Geothermal Flash-Steam Demonstration Power Plant (Baca)

A total of $6,000,000, is requested for the cost-shared 50 MWe Demonstration Power Plant at the Valles Caldera, in New Mexico, which is a decrease of $6,050,000 from FY 1981, consistent with the project funding schedule.

The primary objective of this project is the design, construction, and operation of the first commercial-scale 50 MWe flash-steam geothermal electric power plant which utilizes a liquid-dominated hydrothermal reservoir in the United States. Statistically-reliable engineering and cost data on reservoir performance and plant construction and operation will be provided to the geothermal industry. This project is needed to provide maximum stimulus to non-Federal development in the U.S. for high-temperature, liquid-dominated hydrothermal resources usable for electric power production.

Detailed design and long-lead procurement began in FY 1979, well drilling began in FY 1980, and plant construction began in FY 1981. The amount requested for FY 1982 is sufficient to maintain project schedule.

50 Mwe Geothermal Binary Demonstration Power Plant (Heber)

No funds are requested for the 50 MWe Demonstration Power Plant at Heber California. This is a decrease of $8,000,000 from FY 1981. This project is being turned over to the private participants. Completion will then be determined by market forces. A rescission request for $4,000,000 in FY 1981 is being submitted.

5 MWe Raft River Pilot Plant

No funds are requested for continuing the operation of the Raft River Pilot Plant at Malta, Idaho. This is a decrease of $3,702,000 from FY 1981.

This project is a 5 MWe geothermal binary pilot plant using energy from a moderate-temperature hydrothermal resource (150°C). The objectives of the project are to serve as a test bed for advanced energy conversion concepts, to verify capacity of the hydrothermal reservoir for future development by private industry, and to supply other information on the geothermal reservoir, plant equipment, and plant operations for use in planning and operating future binary cycle generation systems.

Title II design was completed and construction began in FY 1978 and was completed in FY 1980. Plant check-out and start-up will be accomplished in 1981, after which the plant may be turned over to a local utility group.

HGP-A Geothermal Wellhead Generator

No additional funding is required for the Wellhead Generator Project, the operation of which will be paid for by revenues from power produced by the project. The amount apporpriated in FY 1980 was $3,642,000 and no new funding was requested in FY 1981.

The objective of this project is to evaluate the feasibility of using a wellhead generator to produce baseload electrical power. The 3 MWe generator will use the geothermal fluid from a well drilled into the zone of an active volcano in the Puna District, Hawaii. The major power plant components are constructed such that they can be easily moved to other sites at some future date. The project is expected to lead to commercial applications of wellhead generators.

Construction began in the third quarter of FY 1979 and will be completed in the second quarter of FY 1981. Plant operation will commence in the 3rd quarter of FY 1981. The plant will be operated by the Hawaiian Electric Company.

Geothermal Component Test Facility

No funds are requested for FY 1982. This is a decrease of $400,000 from FY 1981. This facility is being decommissioned following successful completion as a test facility for DOE and the private sector.

Geopressured Resources

FY 81 Appropriation	FY 82 Base	FY 82 Request
$35,800	$35,800	$20,336

The FY 1982 request for the Geopressured Resources Program is $20,336,000. This is $15,464,000 less than the amount appropriated for FY 1981, reflecting our inability to select enough additional promising new drill sites to support a higher drilling rate because of our still inadequate knowledge of the geopressured zones.

The general objectives of the geopressure-geothermal program are to fully define the extent and magnitude of the geopressured resource, to determine its economic and technical producibility, and to understand and mitigate the environmental and institutional concerns associated with its production, and thereby encourage commercial development of the resource by the private sector.

Any energy production by 1985 is expected to be derived from a successful resource definition activity that emphasizes the testing of new DOE wells in the Gulf Coast area of Texas and Louisiana. Assuming favorable results, development by the private sector would commence in the mid-1980°s. This would occur as the industry°s perception of risk decreases and economic methane recovery is demonstrated. There is abundant evidence that the existing oil and gas industry can move rapidly to develop geopressured resources if it can be shown that development can be done economically and without severe environmental impact.

Geopressured-geothermal aquifers on the U.S. Gulf Coast are porous sandstone formations containing moderately hot (90 C to over 200 C) water at high pressure (6,000 psi to over 15,000 psi) and of varying salinity. Natural gas (methane) is dissolved in the brine. Estimates of the amount of methane in geopressured aquifers located along the Texas and Louisiana Gulf Coast range from 3,000 to 50,000 quads. This range of uncertainty is a result of the extremely limited information which presently exists on reservoir characteristics and methane concentrations in the formation fluids.

Economic energy recovery projections range from 300 to 5,000 quads. Although thousands of wells have penetrated geopressured aquifers in the search for oil and natural gas, none have been used to produce gas from the brine. The reasons for this have been the low price of gas in the past, the uncertainty of recovery, the high cost of fluid disposal, and environmental concerns. The uncertainities as to the amount of methane in place and the fraction recoverable will be reduced as tests of new and existing wells better define geopressured reservoir characteristics.

The strategy of the program is primarily one of resource definition. This consists of estimating magnitude and distribution from geophysical data, proving the recoverability of the three forms of contained energy, and determining the actual costs of production, utilization, and fluid disposal. Major emphasis is on obtaining data by drilling into and testing geopressured aquifers. Two types of tests are involved: those using unsuccessful oil and gas wells drilled by industry, but which penetrated geopressured aquifers, and those which require new wells designed especially for long-term, high flowrate testing of geopressured reservoirs.

Tests in existing wells were initiated in FY 1978 and are continuing in FY 1981. The current rate is two such tests per year, and it is believed that this rate can be sustained in the future. These wells are usually suitable only for short-term tests because of flow rate limitations and well location, but they provide data on distribution of the resource and fluid characteristics. Such tests are much less costly than those conducted using new geopressured-geothermal wells.

The wells drilled specifically for the DOE geopressured-geothermal program are designed for long-term production tests of up to two years at the high rates of flow necessary to be commercially interesting. Since the physical characteristics of geopressured aquifers vary greatly with geographical location, a substantial number of both types of tests will be required to characterize the resource. The actual number that will eventually be needed is unknown and not amenable to reliable analysis without more resource data. However, a picture of the resource is gradually emerging, and it is currently estimated that approximately 12 strategically placed new wells, supplemented by 20 tests in existing wells over the next five years, should be sufficient to adequately characterize the resource.

The estimated number of new and existing wells for FY 1981 and FY 1982 are as follows:

	Estimated No. of Wells	
	FY 1981	FY 1982
New Wells Drilled	3	1
New Wells on Test	3	4
Tests in Existing Wells	4	2

Geothermal Technology Development

FY 81 Appropriation	FY 82 Base	FY 82 Request
$49,910	$49,910	$20,439

Hot Dry Rock

For FY 1982 $10,000,000 is requested to support the hot dry rock program. The FY 1982 request is $4,000,000 less than the FY 1981 appropriation and results primarily from completion of the drilling phase of thermal loop construction. The delays in constructing and operating that loop also make it appropriate to deemphasize resource assessment and development of additional experimental sites.

The basic goal of the hot dry rock (HDR) program is to demonstrate the practicality of extracting energy from the extremely large hot dry rock resource base. The hot dry rock resource base is larger than both the hydrothermal and geopressured resources combined, and its contribution will become extemely significant if technical and economic feasibility can be demonstrated.

Since 1970 the Los Alamos Scientific Laboratory (LASL) has been developing its approach for HDR energy extraction from hydraulically fractured rock. Since 1978 a nominal 5 MWt thermal loop has been operated on an experimental basis at the Fenton Hill site in New Mexico. The first well of the 20-50 MWt system was completed in FY 1980, and the second well will be completed in FY 1981.

Development of the underground heat transfer system will begin in FY 1982 with a series of fracturing experiments followed by surface system construction and operation. This system will be commercial in configuration and temperature and will provide critically needed data on reservoir lifetime and operating characteristics.

Under an International Energy Agency (IEA) Implementing Agreement, the Federal Republic of Germany has been contributing $2,500,000 per year to the project since FY 1980. Japan joined the agreement in FY 1981. These additional funds have helped to offset offset the cost overruns experienced on the two new deep wells. However, the delays experienced in drilling the wells for the new system at Fenton Hill have made it necessary to cut back the nationwide resource definition effort.

The proposed HDR budget represents the minimum level required to support Fenton Hill development under the IEA agreement.

Component Development

- Drilling and Completions Technology

  For FY 1982 $2,539,000 is requested for development of geothermal drilling and completion technology. This is a $7,211,000 decrease from the amount actually appropriated in FY 1981, and results from a reorientation of the program.

  The program is being reoriented from an across-the-board attack on geothermal drilling and completion problems to emphasing development of only those items that have been determined to have the highest potential for cutting-drilling costs.

This approach delays advanced drilling system development, substantially reducing the cost of the program in FY 1982. The program is closely linked to the industry and has under development technology improvements that can reduce the cost of drilling geothermal wells by 25 percent, thereby impacting the cost of geothermal power.

High priority items include Stratapax bits using man-made diamonds, high speed bits, downhole motors, inert gas drilling, and lost circulation control.

o Energy Conversion

The FY 1982 request for Energy Conversion is $2,500,000, a $8,318,000 decrease from the FY 1981 appropriation. This decrease reflects a reorientation of the program away from activities which are near-term in nature. Those activities dealing with steam technology, downhole pumps, wellbore two phase flow and waste heat rejection systems will be concluded and documented for technology transfer to industry. Those research activities expected to have the greatest long range impact, including two distinct advanced binary-cycle concepts, will continue.

The binary cycle is particularly well suited for increasing brine utilization efficiency (over flash-steam technology) and reducing capital and operating costs for moderate temperature geothermal resources. Moderate temperature resources are inherently more expensive to exploit than high temperature resources because they demand higher brine flow rates. Approximately 80 percent of the inferred 140,000 MWe hydrothermal resource base is moderate temperature. This fraction of the resource base is approximately twice as expensive for power production as high temperature resources currently in production. Accordingly, the FY 1982 program continues development of the most promising binary concept, the direct-contact heat exchanger.

In the direct-contact binary heat exchanger design, the secondary fluid is heated through direct mixing with the brine, thereby eliminating most equipment fouling problems. The heat exchanger capital costs are greatly reduced and efficiency is increased. A limited test of a 500 KWe prototype pilot plant, which is presently operational, will be conducted in FY 1982. Funds requested for FY 1982 total $1,400,000.

o Stimulation

The FY 1982 request for reservoir stimulation is $1,900,000, a decrease of $1,300,000 from FY 1981, which supports a minimum rate of testing in FY 1982.

The geothermal well field constitutes about 50 percent of the cost of a geothermal electric power plant. Consequently, cost-effective means of increasing well production and stimulating "dry holes" will have an immediate, large impact on the cost of geothermal power.

Reservoir stimulation methods have been used routinely for many years in the oil and gas industry; however, those techniques are not directly applicable to the different geologic conditions and high temperatures found in geothermal reservoirs. The approach in the program has been to apply oil and gas techniques to geothermal situations in a

series of progressively more difficult applications, developing new techniques and hardware as needed along the way. In FY 1981, six stimulation experiments will be conducted. The initial tests at Raft River, Idaho, and at East Mesa, California, have been highly successful and the program will be extended to stimulate hotter wells and evaluate various fracturing techniques. The amount requested for FY 1982 will support tests in three high temperature wells.

o Geochemical Engineering and Materials

In FY 1982 $700,000 is requested for Geochemical Engineering and Materials. This represents a $4,095,000 decrease from FY 1981, which is made possible by requiring each field project to pay for its own developmental support in the areas of geochemistry and materials.

The geochemical engineering and materials activities will essentially conclude the ongoing development to increase system reliability and lifetime and concentrate on transfer to industry of corrosion and scale prevention technology developed over the past five years. Geothermal well cement testing being undertaken in conjunction with the Republic of Mexico and the American Petroleum Institute will be continued to determine which cements are best capable of extending well life and reducing well costs. Development projects involving cable, seals, bearings, nonmetallic materials and high temperature geochemical sensors for improved plant controls will be assessed for their commercial potential. Technology transfer projects, workshops, reports and other active interactions with developer and supplier industries will be used to yield the maximum benefits from government-funded R&D.

o Geoscience Technology

For FY 1982, $2,300,000 is requested for Geoscience Technology, a $5,047,000 decrease from the FY 1981 appropriation. This decrease is made possible by reorientation of programs to emphasize longer term technology development that industry is not pursuing.

Programs that are developing geothermal technology in the area of the geosciences include exploration technology, and reservoir engineering.

The exploration technology development activity has as its objectives: improved accuracy and greater reliability in locating geothermal drilling targets, and reduction in the cost of exploration activities by devising more cost-effective techniques. These factors have been identified by industry representatives as the key technical barriers which retard the rate of discovery. Research and development on high risk, high payoff exploration techniques will form the basis of the program in FY 82. The new technology will be demonstrated by means of field surveys in geothermal areas and will be transferred to industry in the form of documented case studies.

Reservoir engineering activities are directed toward the development and implementation of improved techniques that can be used to evaluate reservoir behavior under production conditions and that will permit an assessment of reservoir size and longevity under various production/injection scenarios. The development of validated computer simulations that can be used in predicting the production capability and longevity of a reservoir are crucial to the decisions by resource developers and utilities on the feasibility and desirability of constructing a power plant to use the resource. Reservoir engineering will be conducted at a reduced level in FY 1982.

Well logging services currently available are often unsuited to the hostile environment of geothermal wells, and data essential for reservoir engineering are difficult to acquire. The upgrading of tools from the present rating of 180 C to typical geothermal temperatures of 275 C is essentially complete. High-temperature hybrid

printed circuits have been developed and are being commercially produced. Technology transfer of printed circuits and other components will be continued.

Problems in data interpretation, caused by significant differences between hydrocarbon wells and geothermal wells, are being analyzed and solved. Well log interpretation research will be phased out in FY 1981.

o Environmental Control Technology

Overall, the FY 1982 request of $500,000 for Environmental Control Technology represents a $2,100,000 decrease from FY 1981. This decrease is made possible by having successfully solved, in cooperation with industry, the most pressing environmental problem of hydrogen sulfide abatement. In FY 1982 this program will focus on alterations to surface and subsurface hydrology as a function of hydrothermal fluid production.

Environmental Control Technology previously was funded in the Hydrothermal Industrialization budget category. For FY 1982 this program will be budgeted in the Component Development category.

Program Direction

FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
$2,376	$2,376	$1,600

For FY 1982 $1,600,000 is requested for Program Direction, a $776,000 decrease from the FY 1981 appropriation. This decrease reflects a reduction in personnel postion requirements resulting from the shift of some program responsibilities to the private sector.

The Division of Geothermal Energy has been delegated the responsibility for the management of the DOE Geothermal Program. The Division, in response to the DOE policy, develops the overall program strategy, plans, resource requirements and provides integrated program managment. The personnel required to perform these functions in the Geothermal program totals 25 full-time equivalent positions (20 FTP).

The expertise required to perform these management and technical functions consists of a broad base of skills including backgrounds in research and development, engineering, manufacturing, planning and executive administration.

In order to better utilize the personnel resources available to DOE, the Division of Geothermal Energy has adopted a policy of decentralization which allows for the day-to-day managerial activities to be delegated to DOE field offices and key technology centers. This concept strengthens the working relationships between Headquarters, field offices and laboratories; improves the overall management and utilization of key Federal personnel and provides contractors ready access to cognizant Federal managers; and allows the effective program direction from Headquarters to be performed with a relatively small staff.

The Headquarters responsibilities include the development, direction, control and broad technical management of a complex multi-disciplinary research and development program. The responsibilities include the establishment of program strategies, performance criteria, guidelines for technical progress assessment, milestone progress, cost control, and procurement strategy and planning, as well as detailed program planning. Executive administration is required in terms of budgeting, report analyses, development of managment agreements, and coordination of contractor activities. In addition, there are key interfaces with many Federal and state agencies, public institutions, private industry, and the Congress, as well as international agencies.

DEPARTMENT OF ENERGY
FY 1982 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Operating Expenses-Plant and Capital I pment
Geothermal

(Tabular dollars in thousands. Narrative material in whole doll .)

San Francisco Operations Office

1.	Title and location of project: Geothermal Demonstration Power Plant Project Valles Caldera, New Mexico	2.	Project No. -G-1
3.	Date A-E work initiated: 1st Quarter FY 1979	5.	Previous cc estimate: None Date: None
3a.	Date physical construction starts: 4th Quarter FY 1980**	6.	Current cos stimate: $54,216*** Less amount r PE&D:
4.	Date construction ends: 4th Quarter FY 1982**		Net Cost es ate: Date: Sept er 1, 1979
		6a.	Total DOE f ing Requirement $70,000****

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1978*	$11,951	$11,951	$11,951	7,408
1979*	7,028	7,028	7,028	4,258
1980	20,450	20,450	19,982	10,112
1981	10,911	10,911	11,379	18,655
1982	3,876	3,876	3,876	13,783

* These amounts were derived from operating funds.

** Well drilling initiated in July 1980 due to delay in issuing RECORD OF DECISION. Plant const ion scheduled for Spring 1981 due to delays in issuing RECORD OF DECISION, and obtaining construction permit from New M co Public Service Commission. Plant construction will take 1½ years depending upon winter snow conditions at the s .

*** Total Project Cost is estimated at $143,000,000. Estimate assumes DOE expenses for project su rt and data management at $8,970,000 and approximately 50/50 cost sharing with industrial partners under a cooperative a ement for plant and well field construction at $106,199,000 and operation at $27,831,000 for five year demonstration.

**** Does not include participants' claim of $10 million, to be negotiated, due to delay in issuing VIRONMENTAL IMPACT STATEMENT (EIS) and RECORD OF DECISION.

CONSTRUCTION PROJECT DATA SHEETS

San Francisco Operations Office — Geothermal

1. Title and location of project: Geothermal Demonstration Power Plant Project
Valles Caldera, New Mexico

2. Projec). 80-G-1

7. Continued...

Fiscal Year	Authorizations	Appropriations	Obligat	Costs
1983	0	0		0
1984	0	0		0
1985	0	0		0
1986	0	0		0
1987	0	0		0

8. Brief Physical Description of Project:

The project provides for the design, construction, and operation of a commercial-scale geotherm lectric powerplant which utilizes a liquid-dominated hydrothermal reservoir. The project consists of geothermal well fi development, powerplant and transmission construction, and operation of a 50 MW(e) electrical generating facility.

The demonstration plant will be located within the Valles Caldera at Baca Location #1 in north- ral Sandoval County N.M. The well field and plant sites are approximately 96 km (60 miles) north of Albuquerque and 30 k .9 miles) west of Los Alamos. The lands comprising the original Baca Location #1 Land Grant are owned by the U.S. Fo Service and National Park Service (4 percent), by Dunigan Enterprises and the Baca Land and Cattle Company (96 percent), by the Los Alamos Ski Club (less than 1 percent).

The steam supply system consists of geothermal wells, piping, steam separators, and a liquid in ion system. During operation, fluid will be transported through pipelines from wellheads to localized or "satellit lash separators, from which steam will be piped to the powerplant and gases will be removed from the geothermal fluid the turbine condenser and processed through hydrogen sulfide abatement system prior to release of the gases to the atmosp . A total of 14-17 geothermal wells will be required, depending on drilling success.

The powerplant is a single-flash steam unit, generating 50 MWe gross from 710 kPa (103 psi) ste and from the standpoint of power cycle design will be similar to the closed-condenser system now being designed and constr d at the Geysers in Northern California, where only steam reaches the turbine from the wells. The powerplant consi of a turbine generator building, cooling tower, hydrogen sulfide abatement system, and an electrical switchyard.

CONSTRUCTION PROJECT DATA SHEETS

San Francisco Operations Office — Geothermal

1. Title and location of project: Geothermal Demonstration Power Plant Project, Valles Caldera, New Mexico — 2. Projec . 80-G-1

8. Continued...

Electricity will be transmitted from the plant by a 115 kV transmission line which will connect plant site to the TA-3 substation near Los Alamos.

9. Purpose, justification of need for, and scope of project:

The principal purpose of this project is the design, construction, and operation of a commerica ale geothermal flash-steam powerplant which utilizes a liquid-dominated hydrothermal reservoir in the United States in fur ance of the Federal geothermal program goal

The goal of the Federal Geothermal Program is to accelerate commercial development of geotherma ergy in an environmentally sound manner.

The objectives of the demonstration plant are to provide information on the economic, technolog and environmental aspects of electrical generation from liquid-dominated geothermal resources. Current geothermal techno in the United States is based on the generation of electricity from a vapor-dominated resource and the use of liquid-do ted resources for non-electrical applications. Since almost all of the geothermal resources in the United States are ely to be liquid-dominated and since the development risks of liquid-dominated resources are not well known, this demonstr n is aimed at enhancing development of electrical production from the major portion of the U.S. geothermal resource.

Specific objectives are as follows:

- Demonstrate the social and environmental acceptability and the readiness of state-of-the-art hnology for the production of electrical power using a low-to-moderate salinity liquid-dominated hydrothermal resource;
- Demonstrate reservoir performance characteristics of a specific liquid-dominated hydrotherma servoir;
- Demonstrate the validity of reservoir engineering estimates of reservoir productivity (capab y and longevity);
- Demonstrate flash-steam conversion system technology at commercial scale;
- Provide Federal assistance needed to initiate development at a resource of large potential;

CONSTRUCTION PROJECT DATA SHEETS

San Francisco Operations Office — Geothermal

1. Title and location of project: Geothermal Demonstration Power Plant Project, Valles Caldera, New Mexico — 2. Proje No. 80-G-1

9. Continued...

o Act as a pathfinder for the regulatory process and other legal and institutional aspects of othermal development: and

o Provide a basis for the financial community to estimate the risks and benefits associated w geothermal investments.

10. Details of Cost Estimate*:

	DOE	Non-DOE
a. Engineering, design and construction management	$ 6,062	$ 1,413
b. Construction costs		
(1) Improvements to land, including grading, landscaping, drainage diversion, paving, fencing and pedestrian access walks	1,361	90
(2) Buildings		
(a) Turbine generator building, H_2S Building, and pilings	2,471	373
(3) Process piping and instrumentation	1,156	---
(4) Turbine-generator, condenser, and other mechanical equipment	---	15,251
(5) Electrical equipment	182	969
(6) Transmission line and substation	3,030	2,446
(7) Well field production and injection system	20,156	16,449
(8) Direct labor M&L, construction services, and interest during construction	5,819	1,217
c. Pre-Cooperative Agreement Project Costs (Wells, facilities, land and other costs)	7,416	7,415
d. Environmental Studies	1,634	1,634
e. Contingency (10%)	4,929	4,726
TOTAL PROJECT COSTS	$54,216	$51,983

* Note: The above estimates are based on Cooperative Agreement No. ET-78-F-03-1717.

CONSTRUCTION PROJECT DATA SHEETS

San Francisco Operations Office — Geothermal

1. Title and location of project: Geothermal Demonstration Power Plant Project, Valles Caldera, New Mexico — 2. Proje[illegible]o. 80-G-1

11. Method of performance:

The project is cost-shared under a cooperative agreement with an industrial particpant who wil[illegible] vested with title to the facility. Design will be accomplished by negotiated architect-engineer contract. Constructio[illegible]d procurement are to be negotiated with preference toward fixed price contracts on the basis of competitive bids. Cos[illegible]aring does not extend to overruns for plant construction and operation. The only exception to this provision is cost o[illegible]uns incurred by delays in issuing the Government's final Environmental Impact Statement and Record of Decision.

12. Funding Schedule of Project Funding and other Related Funding Requirements:

	Prior Years	80	81	82	83	84	85	86	87	Total
a. Total Project funding										
1. Total facility cost										
a. Construction line item	$18,979*	$19,982	$11,379	$3,876	0	0	0	0	0	$54,216
b. P&D	0	0	0	0	0	0	0	0	0	0
c. Expense funded equipment	0	0	0	0	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0	0	0	0	0
TOTAL FACILITY COSTS	$18,979	$19,982	$11,379	$3,876	0	0	0	0	0	$54,216**

*Funded from operating expenses in FY 1978 and 1979.

**Does not include participants' claim of $10 million, to be negotiated, due to delay in issuing EI[illegible]d RECORD OF DECISION.

CONSTRUCTION PROJECT DATA SHEETS

San Francisco Operations Office — Geothermal

1. Title and location of project: Geothermal Demonstration Power Plant Project, Valles Caldera, New Mexico — 2. Project: 80-G-1

12. Continued...

	Prior Years	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	Total
2. Other project funding										
a. R&D necessary to complete construction	0	0	0	0	0	0	0	0	0	0
b. Other Project related costs	0	0	0	0	0	0	0	0	0	0
Total other project funding	0	0	0	0	0	0	0	0	0	0
TOTAL PROJECT FUNDING (items 1 and 2)	$18,979	$19,982*	$11,379*	$3,876	0	0	0	0	0	$54,216

b. Total related funding requirement (estimated life of project: 9 years)

1. Facility operating cost	0	0	0	$ 789	$1,435	$1,592	$ 926	576	$ 396	$ 6,814
2. Programmatic operating expenses directly related to the facility	541	43*	1,146	1,335	1,240	1,026	1,346	262	1,031	8,970
3. Capital equipment not related to construction	0	0	0	0	0	0	0	0	0	0

*In FY 1980, of the total $20,500,000 appropriated it is estimated that $1,218,000 was expended for programmatic operating expenses.

CONSTRUCTION PROJECT DATA SHEETS

San Francisco Operations Office — Geothermal

1. Title and location of project: Geothermal Demonstration Power Plant Project
Valles Caldera, New Mexico

2. Projec o. 80-G-1

12. Continued...

	Prior Years	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	Total
4. GPP or other construction related to programmatic effort in the facility	0	0	0	0	0	0	0	0	0	0
5. Other costs	0	0	0	0	0	0	0	0	0	0
Total other related annual funding requirements	$ 541	$ 43	$1,146	$2,124	$2,675	$2,618	$2,272	,938	$1,427	$15,784
TOTAL FUNDING REQUIREMENTS:	$19,520	$20,025	$12,525	$6,000	$2,675	$2,618	$2,272	,938	$1,427	$70,000*

13. Narrative explanation of Total Project funding and Other Related Funding Requirements

a. Total project funding
1. Total facility
a. Construction line item
no narrative required
b. CP&D
no narrative required
c. Expense funding equipment
nothing in this category
d. Inventories
nothing in this category
2. Other project related funding
nothing in this category

b. Total related funding requirements

The estimated life of the project is nine years. The first year is for EIS related activity a egotiation. The next three years are the design and construction period with the balance of time for demonstration.

*Does not include participants' claim of $10 million, to be negotiated, due to delay in issuing the and Record of Decision.

CONSTRUCTION PROJECT DATA SHEETS

San Francisco Operations Office | Geothermal

1. Title and location of project: Geothermal Demonstration Power Plant Project
Valles Caldera, New Mexico

2. Projec o. 80-G-1

13. Continued...

1. Facility operating costs

DOE's portion of operation and maintenance cost consists of operating contract services, sp al well repairs, and an applicable amount of general and administrative expenses.

2. Programmatic operating expenses directly related to the facility

These are DOE's portion of costs to be incurred by the Participant and are not directly rel d to the construction costs of the facility. They are costs necessary for the preparation of the Environmental Impact tement and for environmental monitoring during the life of the project to meet the DOE objectives stated earlier. lso, expenses related to the data gathering, evaluation and dissemination resulting from the demonstration project and t nical monitoring and project support to the project office.

3. Capital equipment not related to construction but related to the programmatic effort in the cility

Nothing to report in this category.

4. GPP or other construction related to programmatic effort

Nothing to report in this category.

5. Other costs

Nothing to report in this category.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

HYDROPOWER

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Hydropower

The goal of the Hydropower program has been to reestablish a vigorous small hydropower industry in the United States. Although hundreds of sites are still in use, this industry has been declining since the 1950's. Many small hydro plants have been retired in favor of large central oil, gas and coal-fired stations, and very few permit applications and new starts were made over a period of several years. The U.S. equipment industry also declined during this period, until only one major turbine manufacturer remains.

Presently, the U.S. has 6,200 megawatts (MW) of developed capacity at sites of 30 MW or less, and the Corps of Engineers has identified over 1,000 prime existing dams in this size category which could be developed for hydropower to produce an additional 7,600 MW. Hydropower is the most significant renewable energy resource presently available, and small hydro, particularly at existing sites, is also capable of being brought on-line in the near term.

The DOE program assumes that rising energy costs will help make smaller hydro plants economically viable and that development should be by non-Federal interests. Incentives are provided under Section 210 of the Public Utility Regulatory Policies Act of 1978 (PURPA), which is to be implemented by the states. This Act requires that power from renewable sources be purchased by utilities at reasonable purchase rates. Tax incentives under the Crude Oil Windfall Profit Tax Act of 1980 are also available for privately owned hydropower development (estimated to be at least 25 to 30 percent of all new projects).

The DOE program has incorporated the following:

- Demonstration projects to demonstrate immediate commercial feasibility, to develop a market for equipment and suppliers, and to provide actual tests for dealing with present institutional and environmental barriers in a variety of situations.
- Mitigation of institutional and environmental barriers at the state and Federal levels, which have a pivotal impact on potential developers, as well as assistance to states for implementing incentives for development.
- Loans for feasibility studies and licensing costs, which help stimulate activity and assist potential developers with front-end costs.
- R&D to improve the economics of retrofit technology and ultra low-head applications.
- Technical assistance to developers for assessing potential projects.

Significant accomplishments for FY 1980 and FY 1981 include:

- Completed selection of 20 demonstration projects, and the first 5 projects were brought on-line in California, New York, Virginia, New Hampshire and Arizona.
- Initiated the loan program for feasibility studies and licensing costs; accepted 320 applications and approved 150 loans in the first 11 months, with an average turnaround time of 3 months.
- Partially funded one field test, and awarded 12 grants for new conceptual approaches for ultra low-head systems of less than 10 feet head.

- Funded guidance documents and materials suited to small hydro projects, including environmental manuals, national site (preliminary) inventories and maps, and feasibility design manuals--the latter of which were performed under the Corps of Engineers, FERC, and the Water and Power Resources Service.

- Coordinated possible financial assistance for developers from programs of other agencies, under the White House Rural Energy Initiative.

- Established components in 10 Federal regions to provide direct assistance to developers, states and others concerned with small hydro development.

- Initiated studies to compare methodologies to offset the new recommendations of the Fish and Wildlife Service for setting stringent minimum streamflows. The new Fish and Wildlife Service procedures threaten to slow or stop many small hydropower projects in New England and could set a detrimental precedent for other regions. They could also negate FERC intentions to exempt projects of less than 5 MW from licensing requirements.

- Encouraged and assisted the states implementation of Section 210 of PURPA by conducting two regional workshops, providing direct assistance to public utility commissions (PUC's) in 10 states, and developing handbooks on PURPA for small power producers in 16 states.

- Held seven state-Federal workshops to assist owners/developers understand state and Federal processes; provided direct technical assistance to 150-200 dam owners and potential developers and responded to over 1,500 public inquiries per month on small hydro.

- Completed assistance to 10 state legislatures, and initiated assistance in 10 additional states, on the legal and institutional barriers to add incentives for hydropower development, with particular emphasis on the economics and power pricing of small hydro.

- Provided funding assistance to 30 states to complete state resource assessments and improve state administrative procedures, such as the establishment of lead agency or one-stop permitting services.

- Completed a major economic prognosis on the ability of small hydro projects to succeed within current economic incentives and a study, required by the Energy Security Act of 1980, to assess the effectiveness of Federal programs and policies affecting small hydropower development.

In summary, the general direction will be an orderly close-out of the hydropower program in FY 1981. Sixteen demonstration projects will remain to be completed, although all remaining funding will be provided in FY 1981 and all are scheduled to be on-line by the end of FY 1985. Contractual arrangements also call for monitoring and reporting on the demonstration projects for a 2 year period after they are brought on-line.

No funding is being requested for FY 1982. Funding has been provided for all projects initiated in FY 1981 or prior years, and monitoring and reporting activities will be done under nonspecific budgeted items. A proposed rescission request of $24,546,000 is being considered in FY 1981.

The DOE small hydro program was initiated in FY 1978 and has been focused on specific, near-term objectives. One of the underlying assumptions has been that the Federal role would terminate when private and other non-Federal interest in small hydropower development was sufficiently "re-awakened." The response of potential developers in recent months has been more enthusiastic than even we expected.

Applications to FERC for preliminary permits have been growing dramatically. Applications increased from nearly 0 prior to 1977 to over 70 applications in 1979 and over 400 in 1980. Interest has increased to the point where most of the applications before FERC are for small hydro projects (two-thirds are for sites less than 5 MW). Over 7,300 MW capacity was represented by the permits pending and in effect as of September 30, 1980. Over 5,100 MW of this total was for sites of 100 MW or less, and 3,100 MW was for sites between 100 KW and 30 MW. FERC has also issued licenses for a total of 20 small hydro projects to proceed to construction during the January 1, 1979 to September 30, 1980 period.

It is evident, as shown by this tremendous growth of interest by the non-Federal sector, that this program has accomplished its major objective. As such, most elements of this program will be terminated or phased out in FY 1981 with the 16 remaining demonstration projects on-line by the end of FY 1985.

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Hydropower
Energy Supply Research and Development -- Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Hydropower				
Small-scale hydropower development				
Operating expenses				
Budget authority	$12,000	$11,011	$11,011	$ 0
Unobigated balance	---	522	---	--
Subtotal	12,000	11,533	11,011	0
Feasibility studies loan program				
Operating expenses				
Budget authority	8,615*	10,000	10,000	0
Unobligated balance	---	14,147	---	--
Subtotal	8,615	24,147	10,000	0
Program direction				
Operating expenses				
Budget authority	644	789	789	0
Unobligated balance	---	54	---	--
Subtotal	644	843	789	0
Total				
Operating expenses				
Budget authority	$21,259	$21,800	$21,800	$ 0
Unobligated balance	---	14,723	---	--
Hydropower	$21,259	$36,523**	$21,800	$ 0

* reflects amount available after furniture rescission of $1,385,000.

** Proposed rescission will reduce total FY 1981 available funds by $24,546,000.

Authoriztion: Sec. 4 P.L. 93-577; TITLE IV, P.L. 95-617;
Sec. 406 & 409 , P.L. 96-299 ; P.L. 96-367

Summary of Changes

Energy Supply Research and Development
(dollars in thousands)

FY 1981 Appropriation enacted	$ 21,800
Built in Increases and Decreases:	
FY 1982 Base	$ 21,800
Program Increases and Decreases:	
Small-scale hydropower development	
o Engineering development-phase out	- 900
o Environmental research-phase out	- 500
o Legal and institutional incentives-phase out	- 388
o Regional activities-phase out	- 1,794
o Demonstration projects-funding completed in FY 1981	- 2,629
o Construction grants (Jackson Mills and Mine Falls,NH)	- 4,800
Subtotal	$ -11,011
Feasibility study loan program	
o terminate in FY 1981	$ -10,000
Program direction	
o Decrease of 19 staff years	$ - 789
FY 1982 Budget Request	$ 0

Small-scale Hydropower Development	FY 1981 Approp.	FY 1982 Base	FY 1982 Request
	$11,011	$11,011	$0

No funds are requested for FY 1982. Program activitics will be phased out in FY 1981.

Feasibility Study and Licensing Loan Program	10,000	10,000	0

No funds are requested for FY 1982. Program activities will be phased out in FY 1981.

Program Direction	789	843	0

No funds are requested for FY 1982. Program activities will be phased out in FY 1981.

DOE/CR-0011/3
VOLUME 6 of 7

REVISED CONGRESSIONAL BUDGET REQUEST

FY 1982

VOLUME 6

FOSSIL ENERGY RESEARCH AND DEVELOPMENT
ENERGY PRODUCTION, DEMONSTRATION, AND DISTRIBUTION

FEBRUARY 1981
U.S. DEPARTMENT OF ENERGY
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

NOTE: Only those pages from Volume 6 of the DOE FY 1982 Revised Congressional Budget Request, pertaining to Conservation and Renewable Energy programs, have been included herein.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY PRODUCTION, DEMONSTRATION AND DISTRIBUTION

VOLUME 6

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SOLAR
FY 1982 REVISED CONGRESSIONAL BUDGET REQUEST
Energy Production, Demonstraton and Distribution - Operating Expense
(Tabular dollars in Thousands. Narrative Material in Whole Dollars)

	FY 1980 APPROPRIATION	FY 1981 APPROPRIATION	FY 1982 BASE	FY 1982 REQUEST
Federal Buildings				
Operating Expenses....	$ 11,750	$ 1,800	$ 1,800	$ 0
Subtotal.....	11,750	1,800	1,800	0
Market Analysis				
Operating Expenses....	6,000	6,000	6,000	0
Subtotal.....	6,000	6,000	6,000	0
Program Direction				
Operating Expenses....	736	740	740	0
Subtotal.....	736	740	740	0
TOTAL				
Operating Expenses....	18,486	8,540	8,540	0
Total.....	$ 18,486	$ 8,540	$ 8,540	$ 0

Authorizations:

Sec. 241-248	P.L. 95-619	Demonstration of Solar Heating and Cooling in Federal Buildings.
Sec. 5-17	P.L. 93-473	Solar Energy Research, Development and Demonstration Act.
Sec. 8	P.L. 95-590	Solar Photovoltaic Energy Research and Development Demonstration Act.

No funding is requested for this activity in FY 1982 because:

- The Federal Buildings Program was terminated in FY 81 as originally planned.
- The market analysis activities supported near-term commercialization efforts that can best be left to the private sector. The new healthier environment provided for solar energy by the decontrol of oil prices and continuing solar tax credits will allow solar to achieve its true potential without DOE commercialization activities.

DOE/CR-0011/3
VOLUME 3 of 7

REVISED CONGRESSIONAL BUDGET REQUEST

FY 1982

VOLUME 3

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

FEBRUARY 1981
U.S. DEPARTMENT OF ENERGY
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

NOTE: Only those pages from Volume 3 of the DOE FY 1982 Revised Congressional Budget Request, pertaining to Conservation and Renewable Energy programs, have been included herein.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

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Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic energy defense activities - operating expenses..	2,408,247	2,384,833	2,952,335	2,861,462	3,728,828	3,598,018
Atomic energy defense activities - plant and capital equipment.....	590,549	482,201	665,305	708,027	1,271,372	1,019,229
General science and research - operating expenses.....	339,663	344,573	378,015	372,000	439,160	436,460
General science and research - plant and capital equipment.....	130,000	124,198	126,400	138,347	128,300	136,690
Energy supply research and development - operating expenses..	2,211,559	2,281,578	2,376,988	2,369,968	2,123,158	2,161,000
Energy supply research and development - plant and capital equipment.....	432,728	461,026	397,587	427,534	342,381	426,000
Uranium supply and enrichment activities.	243,632	242,809	31,755	196,245	164,442	-120,528
Federal energy regulatory commission	68,967	67,088	74,374	77,082	82,173	80,849
Geothermal resources development fund....	181	660	1,301	2,500	200	1,500

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

ELECTRIC ENERGY SYSTEMS

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PROGRAM OVERVIEW

Electric Energy Systems

The Electric Energy Systems (EES) program has five major objectives:

- o Perform a long-term system architecture function and to help successfully integrate new electric sources that are frequently intermittent and unpredictable into the electric power system.
- o Reduce system losses through research on advanced transmission and distribution technologies and component improvements.
- o Improve system load factor through research on new distributed systems which change the pattern of power demand and the relation between demand and generation.
- o Improve system efficiency, reliability, and adaptability under normal and emergency conditions by the use of advanced control system technology.
- o Protect the environment by performing research on the impacts and harmful effects of electric fields.

The EES strategy to attain these objectives calls for assessing the long-term needs of the electric power system and undertaking fundamental research that addresses these needs. This requires a dual function of EES to act as an agent for the electric energy consumer and an architect for the electric system. The program is being redirected to focus on those areas which the private sector cannot or will not pursue. The program is being redirected away from activities that lead to commercialization or improved market penetration. These functions will be accomplished by the private sector.

EES has the sole Federal responsibility to evaluate electric network problems from a "systems" point of view. This includes the development of advanced control strategies as well as specific interface hardware for more complex power systems, models and methodologies for system planning to allow new renewable resource energy devices to work optimally when incorporated on a large-scale into the existing electric network designed for central station generation. It also includes the development of alternatives to overhead transmission lines which will provide safe, environmentally acceptable transmission of bulk power, both within urban areas and inter-regionally for economic and environmental reasons and in times of emergency.

The EES objectives are met by:

- o <u>Assuring Technical Reliability</u>
  - a. Developing methodology to identify the dynamics of increasingly complex electric systems and their response to local and regional control during all types of operating conditions when faced with large central (nuclear, coal) plants far removed from load centers, and with dispersed generation and storage.
  - b. Developing models to analyze high voltage direct current (HVDC) network performance as an overlay to A.C. networks.

- Utility Sector Dispersed Generation and Storage Integration

  a. Providing models for the utility-sector to evaluate the impact of all forms of energy generation and storage.

  b. Developing a family of prototype power conditioners to accommodate dc/ac conversion.

  c. Developing system protection schemes which will protect new generation and storage devices and the system during abnormal operating or fault conditions.

  d. Developing distributed systems techniques to help demonstrate the effect of dispersed storage and generation and improving system operating flexibility.

- Transmission Corridor Options

  a. Resolving the controversy over the effects of high voltage electric fields on plants, animals and humans.

  b. Developing alternatives to overhead lines.

  c. Developing gas insulated equipment as an alternative to open air sub-stations.

  d. Analyzing system application credits and investigating HVDC alternatives for transmission.

- Higher Efficiency System

  a. Developing models for automatic generating control software for improving the operating efficiency of large power plants.

  b. Developing a model for assessing electrical losses and validating it on specific utility systems.

  c. Developing theory, numerical analysis and computer programs for three dimensional electromagnetic fields to improve design efficiencies for transformers.

FY 1981 Accomplishments

- Continued system field tests of 10 heat/cool storage installations, and procurement of equipment for DOE/TVA Power Supply Integration Demonstration.

- Initiated research on enhanced voltage control for large electric networks.

- Initiated distribution system safety and protection requirements study.

- Initiated planning and design methods development for distribution systems.

- Completed the automatic generation control project at Wisconsin Electric Power Company.

- Completed model of alternate energy transmission system options.

- Published results of integration requirements for wind, photovoltaics, and storage.

- Evaluated system impacts and benefits of utility versus customer control of dispersed storage in residential applications.

- Developed power conditioner simulation capability and conceptual prototype designs, and transfer findings to industry standards groups.
- Conducted simulation analysis of previously developed multiterminal HVDC system control methods.
- Initiated the development of advanced methods to incorporate uncertainties in electric system planning.
- Identified communication and control requirements for distributed generation and end-use systems considering use of applicable aerospace technology.
- Initiated research into methods for analysis of power flow in ac/dc networks.
- Started full-scale laboratory tests of ±600kV dc cable.
- Fabricated 100-meter superconducting cable.
- Completed conceptual design of HVAC prototype circuit breaker.
- Completed distribution lightning studies evaluation.
- Completed design of advanced superconducting generator.
- Completed general studies of electric field effects on small animals.
- Completed OTEC riser cable conceptual design.
- Completed 1200kV semi-flexible gas insulated cable design.
- Completed construction of Battery Energy Storage Test (BEST) facility.

FY 1982 Planned Activities

- Continue investigation of harmonic impact on customer equipment and terminate standard harmonic measurement procedures.
- Complete distribution system safety and protection requirements study.
- Phase out initial phase of the development of theoretical methods for load modeling.
- Phase out the initial design and evaluation of integrated multiterminal HVDC system control regime.
- Continue work on modeling uncertainties for system planning.
- Terminate distribution system planning and design methods development projects.
- Complete heat/cool storage system tests.
- Terminate investigation of aerospace and military communication techniques for distributed system applications and development of advanced technology.
- Complete initial evaluation of multivariable plant controller designs.
- Complete initial phase of theoretical development of system stability assessment methods.
- Continue work on emergency state control regimes.

- Complete 1200kV circuit breaker feasibility study.
- Complete DC Interrupter R&D, and initiate development of DC circuit breaker prototype.
- Complete development of 1200kV gas insulated semiflex cable.

Electric Energy Systems
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Electric Energy Systems				
System architecture and integration				
Operating expenses	$16,900	$19,000	$19,000	$ 4,100
Capital equipment	100	0	0	0
Subtotal	17,000	19,000	19,000	4,100
Power delivery				
Operating expenses	18,300	18,500	18,500	4,525
Capital equipment	700	1,500	1,500	400
Subtotal	19,000	20,000	20,000	4,925
Generation and storage applications				
Operating expenses	0*	0*	0*	0
Subtotal	0	0	0	0
Program direction				
Operating expenses	1,063**	923	923	875
Subtotal	1,063	923	923	875
Total				
Operating expenses	36,263	38,423	38,423	9,500
Capital equipment	800	1,500	1,500	400
Electric Energy Systems	$37,063	$39,923***	$39,923	$ 9,900

* A total of $9,000,000 in FY 1980 and $6,200,000 in FY 1981 was budgeted in the DOE Energy Storage Program for Electric Storage Applications.

** $277,000 has been deducted to reflect FY 1980 federal government furniture rescission.

*** Proposed rescission will decrease the FY 1981 appropriation by $4,882,000.

Authorization: Section 4, P.L. 93-577

Summary of Changes

Energy Supply Research and Development
(dollars in thousands)

FY 1981 Appropriation enacted	$39,923
Built in increases and decreases:	
FY 1982 base	$39,923
Program increases and decreases:	
System architecture and integration	
• New technology integration	- 7,826
• Load management - termination	- 5,910
• Systems control and development	- 1,164
Subtotal	$- 14.900
Power delivery	
• Underground transmission and compact stations	- 5,251
• High voltage direct current technology	- 1,103
• Electric field effects	- 1,895
• High voltage alternating current technology	- 5,726
• Capital equipment	- 1,100
Subtotal	$- 15,075
Generation and storage applications	
• Storage applications - previously budgeted in the DOE Energy storage program	+ 0
Subtotal	$+ 0
Program direction	
• Decrease in personnel funding	- 48
Subtotal	$- 48
FY 1982 budget request	$ 9,900

SYSTEM ARCHITECTURE AND INTEGRATION

FY 1981 Appropriation	FY 1982 Request
$ 19,000	$ 4,100

The FY 1982 budget request for Systems Architecture and Integration is $4,100,000 which represents a $14,900,000 reduction from the FY 1981 appropriation of $19,000,000. Load management, distribution automation and control and some new technology integration projects will be phased out because further development will be better accomplished by the private sector.

Subprograms	FY 1981 Budget Authority	FY 1982 Requested Budget Authority
New Technology Integration	$ 9,926	$ 2,100
Load Management (Distributed Systems)	5,910	0
Systems Control and Development	3,164	2,000
	$ 19,000	$ 4,100

In the past, the rapid growth and development of the electrical energy supply systems of the United States have been characterized by the early development and timely implementation of advanced technologies to cope with the issues and challenges of the present day while meeting future demands of the electrical energy consumer. The System Architecture and Integration program is designed to address the long-term problems encountered in the future development, operation and control of electrical energy systems by conducting high-risk, long-term high payoff research. Future power systems must integrate new source technologies that may be uncontrolled, dispersed, intermittent and geographically limited. They also must be planned and operated to be larger, more tightly interconnected and more optimally designed than now possible. Finally, greater uncertainty will become increasingly apparent in areas of: longer lead times for construction of new facilities, changing load patterns and growth rates, reliance on a combination of remote large generating plants and intermittent energy sources, fuel availability, and increased environmental, financial and regulatory constraints which will require more advanced planning methods and operating strategies than now available.

The overall goal of the System Architecture and Integration program is to conduct an effective RD&D program which develops strategies, methodologies, advanced analytical tools and hardware leading to: enhanced efficiency and economy in system control and development; effective integration of alternative technologies into future electrical systems; and use of advanced system control and development concepts for the larger and more complex electrical energy systems expected in the future. This goal is being accomplished through three subprograms; namely, New Technology Integration, Load Management (Distributed Systems), and Systems Control and Development.

New Technology Integration

The FY 1982 budget request for the New Technology Integration subprogram is $2,100,000 a decrease of $7,826,000 from the FY 1981 level. This will be used to develop methods and analytical tools to assess the impact of dispersed generation, storage and end use management on the design of future power systems. Fundamental R&D will be focused on enhanced concepts in rapid service restoration and with the complex interactions and uncertainties in the development of future systems.

The New Technology Integration subprogram is principally concerned with the relationships between the new technology characteristics and the power system design and operating requirements. The subprogram is developing improved system

planning methods and operating strategies to incorporate competitive new technology sources into an ever expanding electric energy system containing an expanding number of large remote nuclear and coal plants. The goal is to assure that the appropriate power system engineering tools, methods and hardware will be available for the timely integration of all energy sources into the nation's electric power systems.

The key items which need to be addressed for technology integration are regional siting issues, experimental information requirements, generation expansion planning, transmission planning, unified planning methods, reliability concepts, credit evaluations, dynamic performance analysis, operating strategy development, load models, restoration practices, and multiple technology economic competition and interaction simulations. The FY 1982 program will address dynamic performance analysis, operating strategy development, and restoration practices.

The subprogram goal translates into four primary objectives: assessment of the special characteristics and identification of key issues to be resolved for successful integration with the electrical system; development of improved models, methods, data and advanced concepts for planning and operating the power systems of the future; definition of DC source interface requirements with the AC system, and development of critical power conditioning interface hardware; and conduct of theoretical research on fundamental electric energy systems issues which cut across both conventional and new technologies.

There are two fundamental reasons for the need for advanced planning tools and operating methods. These are the increased complexity of future electric energy systems due in part to the development of new supply technologies and the expansion of remote generating plants, and the increased uncertainty in future operating requirements and constraints. This issue of complexity arises in part because the characteristics of conventional electric energy supply technologies are very different from those of almost all new technologies currently under development. For example conventional plants are large and very reliable, their operation is seldom limited by the lack of primary fuel, their power production level can only be changed slowly and their operation is independent of weather conditions. In sharp contrast, most new energy sources are small, the energy supplied tends to be intermittent due to the spatial and temporal fluctuations in the solar resource, their location is confined to certain regions due to the geographical distribution of the renewable resource and their energy output is not correlated with system load requirements. Likewise, the issue of uncertainty arises due to longer construction times, economic uncertainties, fuel limitations, uncertain load growth, implementation of policies to encourage small power facilities and proposed new rate structures. These factors greatly complicate any planning requirement.

Today's electric energy systems reflect the characteristics of present conventional technologies and perceived future requirements. To accept expected generation and storage options fundamental changes in present planning and operating philosophies are clearly required. A proper understanding of the capabilities, behavior and limitations of all sources is required for developing optimal planning methods and operating strategies.

With the advent of economical direct current options interconnected at any level of the power system, the question of acceptable level of AC power quality takes on increasing significance. For example, the increased level of harmonic currents caused by DC sources and the potentially harmful voltage fluctuations which would result. Successful development of the ac/dc interface hardware will assist in the control of system voltage with minor harmonic additions, thereby increasing system operating flexibility and minimizing detrimental impacts such as communications interference and reduced efficiency and life expectancy of system equipment and customer appliance.

The benefits which could result are the optimal use of new and conventional technologies in electric energy systems, and improvement in overall system reliability and operating flexibility.

Newly developed planning and operating models and simulation capability, and effective interface equipment can influence designs of both new technologies and

evolving power systems. In this way, the risk of equipment failures and system incompatability will be minimized and customer acceptance of new technologies greatly enhanced.

FY 1981 Accomplishments

- Used integration assessment methodology developed in FY 1980 to analyze integration requirements for wind, PV, and storage.
- Examined the merits of proposed advanced control concepts for technology integration.
- Defined experimental information requirements for verification of new technology integrated performance characteristics and impact assessments.
- Evaluated system impacts and benefits of utility versus customer control of dispersed storage in residential applications.
- Developed simplified wind and OTEC models for expansion planning and dynamic performance assessments.
- Developed power conditioner simulation capability and conceptual designs, and transfered information to industry and associated standard groups.
- Completed stochastic load flow method of network analysis.
- Completed initial evaluation of energy storage via multivariable optimization methods.
- Completed the initial development of methods to improve distribution system reliability by optimal system architecture and control.
- Refined existing procedure for developing near-term system load models.
- Conducted simulation analysis of previously developed multiterminal HVDC system control methods.
- Evaluated procedure for determining effect of DC transmission systems in AC networks.
- Initiated research in restarting large electric energy systems after major shut downs.
- Initiated research on methods for the analysis of power flow in AC/DC networks.

FY 1982 Planned Activities

- Terminate operating impact studies for wind and PV technologies for system stability, load following, and spinning reserve requirments.
- Develop designs for advanced interface equipment and terminate prototype variable speed wind generator model.
- Continue investigation of harmonic impacts on customer equipment, and terminate standard harmonic measurement procedure.
- Terminate innovative wind farm integration method.
- Phase out initial phase to develop theoretical methods for load modeling.
- Phase out the initial design and evaluation of an integrated multiterminal HVDC system control regime.
- Continue at a reduced effort work on modeling uncertainties for system

planning.

- o Continue work on optimal power system restoration procedures.

- o Terminate work to develop methods for network analysis.

Load Management

The FY 1981 appropriation for Load Management was $5,910,000. No funds are requested for FY 1982; there will be a residual effort in FY 1982 with prior year funds, after which the program will be phased out. The key elements which have been addressed in the program are the development of distribution automation, communication, and control equipment and strategies for the operation of distributed generation and end-use technologies; the development of distribution system planning and design methods, and distribution system safety and protection schemes for future distributed systems; and the determination of operating impacts of distributed systems through heat/cool storage demonstrations, the DOE/EPRI distribution communication systems demonstrations, and the DOE/TVA/Athens Utility Board Power Supply Integration Demonstration (PSID). In FY 1982, this will be phased out. DOE assumes that the Athens Utility Board in Tennessee will raise the remaining funds necessary to complete the baseline program and that TVA will operate it, and gather, analyze and disseminate data to the industry. With the completion of these activities, DOE assumes that private industry will initiate the programs required to achieve the remaining objectives to obtain the necessary cost and performance data. DOE will monitor and review the situation in the future to determine if any additional federal role is necessary.

The emphasis of the Load Management subprogram has shifted during the past year such that it is now focussed on the planning, design, and operational aspects of distributed generation and end-use technologies in electric distribution systems. The subprogram goal has been to insure that the distribution system of the future will be able to accommodate the diverse impacts brought about by the incorporation of load management concepts and the integration of new technologies such as small wind machines, fuel cells, batteries, and cogeneration.

FY 1981 Accomplishments

- o Identified communication and control requirements for distributed generation and end-use systems, evaluated appropriate aerospace technology, and initiated development program.

- o Initiated distribution system safety and protection requirements study for distributed systems.

- o Developed advanced system planning and design methods for distribution systems.

- o Completed field tests of present distribution communication systems.

- o Continued field tests for 10 heat/cool storage load management systems and equipment procurement for DOE/TVA Power Supply Integration Demonstration.

- o Initiated study of substation based energy management control system for distributed technologies.

- o Improved power systems simulator operating capabilities.

FY 1982 Planned Activities

- o Complete distribution system safety and protection requirements study with prior year funding.

- o Terminate development of distribution system planning and design methods projects.

- Complete heat/cool storage load management system tests with prior year funding.

- Transfer the DOE/TVA Power Supply Integration Demonstration to the Athens Utility Board for completion.

- Terminate study of substation based energy management control system for distributed technologies.

- Terminate investigation of aerospace and military communications techniques for distributed system applications and development of advanced technology.

Systems Control and Development

The FY 1982 budget request for this subprogram is $2,000,000 which is a reduction of $1,164,000 from the FY 1981 appropriation of $3,164,000. The Systems Control and Development subprogram performs basic research on generic control and operational issues in large electric energy systems, conducts computerized simulation studies of highly promising control and operational concepts and, with utility cooperation, supports highly selective field tests. In FY 1982 the Systems Control and Development subprogram will continue at a reduced level its basic research and simulation activities and phase out the design of advanced HVDC control methods.

In addition to the widely perceived fact that the electric energy systems of today are comprised of vast transmission network which interconnect energy supply sources with the widely dispersed consumers, there is also a complex control hierarchy containing thousands of automatic and manual control systems. These control systems range from very localized subsystems, responsible for regulating temperatures and pressures at a local power plant, for example, to individual utilities or utility pool applications which continuously regulate both the internal energy supply and the exchange of energy between utility systems or pools. These active controls enable the effective coordination of processes and systems to permit the vast capital investment in utility plant to operate with greater efficiency and security than otherwise possible.

The goals of the Systems Control and Development subprogram are to improve the overall system efficiency, to promote enhanced system reliability and to insure the availability of electric energy control regimes which are compatible with the operating characteristics of advanced energy supply and storage technologies. The goals are to be achieved by the development and dissemination of advanced process models and control concepts which are directed towards resolution of generic control and operating issues in large electric energy systems. Examples of these generic issues are the control of large systems during emergency conditions, the identification of vulnerable system operating conditions, and the effectiveness and merits of decentralized versus centralized control in large systems.

As electric energy systems increased in size, the control requirements become highly complex. However, as system control is not the responsibility of those developing the conventional and new source technologies, these issues tend to be ignored. Present control methods and associated simulation tools are not suited to the needs of future electric energy systems and require a focussed fundamental research effort to insure their timely development. The Systems Control and Development subprogram represents this focus for large electric energy systems.

The benefits due to improved control of large scale energy systems are: increased process and system efficiency; enhanced system operating security and flexibility; accelerated use of central and dispersed renewable energy sources; reduced environmental impact of energy production; enhanced performance with increased life expectancy of critical equipment. Not all of these benefits can be easily quantified and in fact some may be in direct conflict, e.g., increased efficiency and reduced environmental impacts.

FY 1981 Accomplishments

- Completed the automatic generation control project at the Wisconsin Electric

Power Company.

- o Completed initial work on the development of advanced theoretical methods for relating cost, worth, availability and reliability of electric energy service.

- o Initiate research on enhanced voltage control for large electric energy systems.

FY 1982 Planned Activities

- o Complete initial evaluation of multivariable plant controller designs.

- o Complete initial phase of theoretical development of system stability assessment methods.

- o Continue work on emergency state control regimes.

- o Continue theoretical work on development of control strategies for large scale systems.

- o Continue the development of an advanced integrated operations scheduling procedure.

- o Complete the theoretical development of analytical methods for systems stability assessment.

- o Continue at a reduced effort the research on enhanced voltage control for large electric energy systems.

- o Phase out the initial design and evaluation of an integrated multiterminal HVDC system control regime.

POWER DELIVERY

FY 1981 Appropriation	FY 1982 Request
$20,000	$4,925

The FY 1982 budget request for Power Delivery is $4,925,000 a net decrease of $15,475,000 from the amount appropriated in FY 1981. The preliminary guidelines for design of alternating current overhead transmission lines to mitigate potential health effects will be issued in FY 1984. The benefits of high efficiency projects will continue to be quantified to accelerate conservation with appropriate technology development to follow in later years.

Continued adequacy of the nation's bulk generation and transmission systems can no longer be assured; it is being threatened by delays in constructing new generating facilities needed to accommodate the expected changes in system structure and failure to meet future demands for power even in this era of reduced load growth. Potential problems cannot be easily addressed if flexibility in siting of generating capacity requires the construction of new transmission facilities: (1) to transport power to load centers; and (2) to interconnect the various utility systems so as to make available the improved economics and efficiencies of interregional power transfer. Right-of-way acquisition for new transmission lines is becoming extremely difficult, as difficult as the siting of new generation. Utility antagonists have begun to oppose the construction of transmission lines vigorously. This growing transmission corridor problem is most acute for large urban utilities, and is the result of social and institutional attitudes. These factors have contributed to the exigency of providing viable power delivery options to manage this problem.

Increasing power transfer capacity has served as the benchmark for the Power Delivery program. Coupled with the concerns of electric field effects on living organisms, the Power Delivery program has evolved to address these concerns in a wholly integrated fashion. These issues have led into energy conservation projects addressing improved electric energy system efficiency, as well as reliability of the power grid to minimize the impact of prolonged outages. These efforts directly support the integration of dispersed renewable resource generation and storage into the dynamic electric energy network.

Program Elements	FY 1981 Budget Authority	FY 1982 Requested Budget Authority
Underground Transmission	$ 6,701	$1,000
HVDC Technology	3,028	1,925
Electric Field Effects	3,145	1,000
HVAC Technology	7,126	1,000
Total, Power Delivery	$20,000	$4,925

Underground Transmission

The FY 1982 budget request for underground transmission subprogram is $700,000, and $300,000 in capital equipment. This is a decrease of $5,251,000 in operating funds and a decrease of $450,000 in capital funds.

The underground transmission program has been structured to provide alternatives to resolve the transmission corridor problems which exist whenever electric energy is prevented from reaching the load due to the lack of sufficient corridor over which to transport that power. The critical nature of this crisis was difficult to quantify until an event such as the 1977 New York City Blackout occurred. The technical alternatives that are being pursued are those which offer the greatest economic benefits to the nation's electric industry. Extensive economic comparisons have been made to establish the viability of gas insulated and superconducting cables on utility networks where high power capacity systems are needed. These studies have substantiated the technical and economic alternatives to overhead lines and conventional underground cables which the advanced technologies can provide. Improved underground to overhead lines cost ratios in the vicinity of three to one have been shown to be possible versus five or six to one ratios for conventional technologies. This reduction in capital investment translates into several hundred million dollars per installation of a high capacity system.

As metropolitan boundaries expand, the requirement for increased power capacity for underground systems becomes even more critical; hence the need for cable systems with power ratings comparable to overhead lines becomes necessary. Several projects to increase the power rating of underground transmission systems are underway -- compressed gas insulated cables, ac superconducting cables, and generic submarine cables -- and will be phased out. As much as possible, these projects will be ascribed to the private sector for completion.

In FY 1982 a number of important projects, such as fundamental studies of electrical insulation phenomena, load monitoring computer softwave, and basic aging characteristics of insulation systems will be pursued, so critical analysis and evaluation tools will be available to the developers of future underground equipments. These fundamental studies provide the important link between basic material theory and cable system applications.

FY 1981 Accomplishments

- Determined threshold voltage level for safe operation of extruded insulation systems.
- Completed fabrication of 100 meter enclosure and refrigeration system at Brookhaven National Laboratory.
- Initiated electromechanical tests of submarine riser cables for OTEC pilot plant.
- Finalized design for 1200 kV semiflexible compressed gas insulated transmission line.
- Completed assembly of 1200 kV compressed gas test loop at EPRI's Waltz Mill Underground Transmission Test Facility.
- Started fabrication of 100 meter long ac superconducting cable.

FY 1982 Planned Activities

- Complete determination of threshold voltage levels for polymeric insulated and oil-filled paper insulated cables.
- Complete full scale field tests on 1200 kV compressed gas insulated transmission line at Electric Power Research Institute's Waltz Mill Underground Transmission Test Facility.

- o Complete fabrication of 1200 kV semi-flexible gas insulated transmission lines and initiate evaluation phase at Bonneville Power Administration's (BPA) Lyons UHV Test Facility.

- o Phase out superconducting cable project at Brookhaven National Laboratory.

- o Continue studies in basic insulation gases, particularly toxicity tests.

High Voltage Direct Current Technology (HVDC)

The FY 1982 budget request for the high voltage direct current (HVDC) program is $1,925,000, a slight decrease of $1,025,000 over the FY 1981 appropriation. The key activities included in this project are: HVDC circuit breaker, and application/planning studies. In FY 1982, work will continue on the dc circuit breaker design effort with BPA.

Transmission of large blocks of electric power using dc transmission has only become practical in the last few decades. Its primary application has been for long underwater transmission, overhead line requirements hundreds of miles long for transferring 1,000 MW or more, and asynchronous ties between neighboring utilities. HVDC is a natural technology to utilize when transmission corridor acquisition becomes difficult.

System realiability can be considerably improved because of the asynchronous nature of dc; thus, the stability of a parallel ac system can be enhanced. Further HVDC has the advantage of controllability which can direct power flow directly to the load without encountering the difficulties inherent in controlling an HVDC system.

Because of the conversion equipment, HVDC terminals have higher losses than HVAC; however, research has reduced the difference, and the cost of losses can be offset by other benefits. The Power Delivery program in HVDC equipment has concentrated on capturing the potential benefits of such as the HVDC circuit breaker which is needed for network applications. At present all HVDC installations are point to point, and the line cannot be tapped without a circuit breaker. The absence of a circuit breaker penalizes HVDC by requiring an extra terminal for each load and reduces its flexibility for control and fault isolation. A project developing the HVDC breaker has progressed to the prototype design state; economic assessment on the breaker and its use in HVDC systems are being done in parallel in FY 1981. A joint project with BPA has been initiated to develop a circuit breaker for test at the Cellilo (Oregon) dc terminal, and to establish the cost benefits of dc circuit breakers interconnected with ac systems.

Power Delivery is conducting basic research in the metrology involved in producing silicon crystals for the fundamental thyristor element. The technical impact that wider application of HVDC can have on increasing power density in a given transmission corridor, either through conversion of a present ac line or by construction of a new dc line, has lead Power Delivery to focus on studies which will enhance the knowledge of HVDC and its interaction with the ac system. HVDC links can be an effective current limiter reducing duty on nearby ac circuit breakers. Also, its inherent controllability features can act as a damper for parallel ac systems, thus allowing higher loadings on the ac system without reducing stability. Since HVDC cables require no capacitive charging current, it can be used underground for any distance, such as, long lines into major population centers. A number of assessments and system studies are underway to determine cost/benefit ratios for various dc options and applications. These studies will continue through FY 1981 with some results available for program decisions in FY 1982.

FY 1981 Accomplishments

- o Initiated the design for a slow speed HVDC circuit breaker in cooperation with BPA.

- o Commenced fundamental studies of dc interruption concepts.
- o Started full scale verification tests on ± 600 kV dc cable at EPRI's Waltz Mill Underground Transmission Test Facility.
- o Continued dc transmission options assessment of competing technologies.

FY 1982 Planned Activities

- o Complete fundamental investigations of HVDC current interruption techniques.
- o Conclude efforts to provide non-destructive testing techniques to industry in order to improve realiability and availability of semi-conductor devices for ac/dc conversion.
- o Continue efforts to provide systematic evaluation and economic assessment study of dc transmission systems to prove the effectiveness of this improved efficiency concept in a way never before attempted.
- o Continue specific system studies to quantify overall application credits of dc systems interconnected with ac systems.

Electric Field Effects (ELF)

The FY 1982 budget request for electric field effects is $1,000,000 in operating funds, a decrease of $1,895,000 in operating funds and $160,000 in capital equipment funds from FY 1981. The electric field effects project is keying in on the determination of possible health effects from overhead transmission lines due to ac and dc fields, and will be phased down to include only key biological studies.

The possibility of hazards to the health and safety of humans exposed to electric fields radiated by high-voltage transmission lines is an important public concern. Available data from U.S.S.R., Western Europe, and the United States are contradictory and controversial. At this time, it is impossible to state definitely that a hazard does or does not exist. In FY 1981 DOE sponsored a multi-disciplinary program of research to identify and characterize health effects that may be induced by electric and/or magnetic fields associated with high-voltage (HV) overhead transmission lines (both dc and 60 Hertz ac types). This is a coordinated program jointly funded and managed by the Office of Electric Energy Systems (EES), DOE Office of Health and Environmental Research, Bonneville Power Administration and Tennessee Valley Authority.

Research to obtain factual information on the environmental effects of electric fields associated with 1200 kV transmission was initiated because of public concern over construction permits for 765 kV ac transmission in New York and 500 kV lines in other states (California, Maryland and Pennsylvania). DOE's activities have addressed both ac and dc systems. Sufficient data is not available to determine the hazards, if any, to biological systems exposed to electric fields from transmission lines.

FY 1981 Accomplishments

- o Initiated major baboon study to determine behavioral effects.
- o Continued ecological study on crops grown beneath transmission lines.
- o Investigated scaling of body currents in mice and rats to humans (simple models).
- o Completed biological assay tests on small animals and focused on effects found.
- o Quantified the dc ion, space charge and electrostatic field effects for operating dc lines in U.S.

FY 1982 Planned Activities

- o Complete studies on Chinese Hamster Ovary (CHO) effects to observe mutation.
- o Complete electric field simulation of neural development in rats.
- o Establish a working hypothesis on pineal gland (in rats) interactions with electric fields as related to central nervous system.
- o Characterize electric fields typically encountered under transmission lines (with TVA).
- o Understand electric field interactions with biological tissues.

High Voltage Alternating Current Technology (HVAC)

The FY 1982 budget request for the high voltage alternating current (HVAC) program is $1,000,000 in operating funds, a decrease of $5,726,000 in operating funds and a decrease of $500,000 in capital equipment funds from FY 1981. In FY 1982, the transmission and distribution system loss model will be expaned to cover more generic applications.

The electrical load growth in the United States has roughly doubled each decade. Efficient and reliable delivery of this power has been accomplished through a corresponding increase in transmission voltages. When 1200 kV transmission system is initiated about 1987 to 1990

this historical pattern will be continued. While it is true that the same power delivery capability can be obtained by just increasing the number of lower voltage lines, an assessment of overall network operating requirements, economics, system efficiency, environmental impact and system reliability will normally show this to be undesirable.

The DOE program in ultra high voltage transmission has concentrated on system analyses, option assessments, efficiency improvements, and, in some cases, prototype design and construction of components for use in a gas insulated station. The need to move away from air insulated substations to compressed gas stations is an aspect of design which was not considered in the last upward step in transmission voltage. The sheer physical size of the equipment, support insulation, and buses, with the attendant mechanical difficulties, have forced the industry into the realization that air as an insulation medium for substations is impractical for 1,200 kV, regardless of location, and undesirable at lower voltages. A reduction in land usage by a factor of 10 to 1 over an open air insulated design is achievable with an enclosed gas insulated substation. An exhaustive cost/benefits study of transmission systems indicated a cost savings for 1200 kV versus 500 kV in the range of $2,000,000/mile for equal power transfer systems.

FY 1981 Accomplishments

- Completed conceptual design of a 1200 kV gas insulated circuit breaker.
- Fabricated 50 MVA laboratory model for the gas insulated transformed project.
- Initiated R&D for higher efficiency electric motors.
- Completed preliminary T&D loss model.
- Completed alternative energy transportation study.
- Finalized design for 10 MVA superconducting generator.
- Completed preliminary lightning studies on distribution lines.

FY 1982 Planned Activities

- Continue the investigation into higher operating efficiencies for integral horsepower motors for industrial, commercial, and residential drive systems.
- Expand utility data base for transmission and distribution loss analysis model.

STORAGE APPLICATION

FY 1981 Appropriation	FY 1982 Request
$6,200	0

The FY 1981 appropriation for Storage Application was $6,200,000. There are no funds requested for FY 1982. The program will be phased out, with a small residual effort left in FY 1982 with remaining FY 1981 and prior funds.

The Storage Application program has been designed to minimize capital investment and maximize resource conservation by the electric utility system. This can be done most effectively by improving capacity utilization and reducing oil consumption through efficient application of power produced by coal-fired and nuclear generating stations. The load profile for electric power uses varies daily, weekly, and seasonally. Since the load profile is not constant, current dispatch practice brings peaking machinery such as oil-fired combustion trubines on line to accommodate these periodic increases in power requirements. The alternative is to increase the level of efficiently produced nuclear or coal-fired base-load power, store the excess of available energy produced during off-peak periods as chemical, mechanical, or thermal energy and to use this availability to satisfy peak load power needs.

The Office of Electric Energy Systems provides technical advice and assistance to component developers and utilities on integration issues associated with application of non-conventional storage technologies. Identification of these requirements in a timely fashion promotes early penetration into the utility marketplace. A most important prerequisite to utility consideration of any change in current operating procedures is demonstration of the option in a credible fashion. This requires actual application of the option on a utility system so network compatibility is confirmed and economic feasibility verified. The Storage Application program has addressed those technologies which have gone through sufficient research and development effort to verify conceptual and technical feasibility and are now ready for operational feasibility tests.

The Storage Application program consisted of two specific areas, both will be phased out:

Battery (Chemical) Storage

- Battery Energy Storage Test (BEST) Facility - Utility integrated test station evaluating new load levelling batteries in the Public Service Electric and Gas Company of New Jersey system will be shut down.
- Storage Battery Electric Energy Demonstration (SBEED) - This cooperative utility feasibility test in Michigan using energy battery storage through application of state-of-the-art lead acid batteries will be terminated.
- Advanced Battery Application - Load levelling batteries for evaluation in the BEST facility will be terminated.

Mechnical Energy Storage

- Compressed Air Energy Storage (CAES).
- Underground Pumped Hydro (UPH).
- Adiabatic Compressed Air Energy Storage.

Existing project efforts have been directed towards the identification of specific utility oriented problems relating to geologies, regulatory constraints, market and cost assessments, and required industry intra-relationships for commercial application of this option. This work will be phased out.

FY 1981 Accomplishments

- o Completed construction and checkout of baseline BEST facility (first Bay).
- o Initiated construction of second Bay to accommodate zinc-chlorine batteries.
- o Initiated design phase of SBEED demonstration.
- o Established operational feasibility of zinc-chlorine batteries in a utility environment before commitment to manufacture total requirement.
- o Established conceptual viability of CAES system for all geologies.
- o Initiated investigations on viability of a site specific UPH facility.

FY 1982 Planned Activities

- o Activity will be phased out.

Program Direction

FY 1981 Appropriation	FY 1982 Request
$923	$875

The FY 1982 budget request for Electric Energy Systems Program Direction is $875,000, a $48,000 decrease from FY 1981 appropriation.

The Electric Energy Systems (EES) program develops the overall program strategy, plans, resource requirements and provide integrated program management for the program described in this document. Further, EES is called upon to provide expert technical advice with respect to electric utility generation and delivery systems, operations and planning throughout DOE and to many other Federal agencies. The personnel allocated to perform these functions in the EES program total 10 full-time staff positions. The full-time equivalent staff positions is 16, which includes 4 FTE from the phased out Hydropower Program.

As a result of the redirection of the program in FY 1982, personnel requirements are reduced. Selective decentralization of day-to-day managerial activities will be further delegated to DOE key technology centers which will work independently from headquarters oversight.

Headquarters responsibilities include the establishmnet of performance criteria, the assessment of technical performance and milestone progress, cost control procurement strategy and planning, as well as both short- and long-term program planning. Executive administration is also required in terms of budgeting, report analysis, development of managerial agreemnets and coordination of contractor activities. In addition, there are key interfaces within DOE, with numerous Federal agencies, private industry, and the Congress as well as international programs.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

ENERGY STORAGE SYSTEMS

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PROGRAM OVERVIEW

ENERGY STORAGE RESEARCH AND DEVELOPMENT PROGRAM

Purpose

The Energy Storage Research and Development Program provides the vital technology link between energy supply, energy conversion, and energy end-use. This program serves as the nucleus for virtually all research and development activities related to energy storage within the Department and, as such, supports the renewable energy needs as well as the end-use sectors in conservation.

The concept of energy storage is not new; for example, sunlight is stored in plants by photosynthesis, and the earth has stored energy for hundreds of millions of years in forms such as natural gas, petroleum, and coal. In the present program, energy storage technologies employing electrochemical, mechanical, chemical, magnetic, and thermal techniques are being explored.

The goal of the present program is to provide the technologies required to assist the private sector in supplying reliable, low-cost, safe, and environmentally acceptable energy storage. The resulting energy storage technologies will provide one or more of the following benefits:

- Increase the substitution of coal, nuclear, and renewables for petroleum and natural gas.
- Increase the use of renewable but intermittent energy sources by providing continuous service.
- Increase energy productivity by either increasing the efficiencies of electrolytic processes or by recovering waste heat from many energy wasteful processes commonly in use today.
- Increase effectiveness of baseload electric power generating and distribution capacity by reducing the need for new peaking equipment.

Program Strategy

The strategy for achieving these benefits is to support research that provides a firm technology base in a variety of disciplines. This base is available for industry to further develop long-term energy storage for use in transportation, building heating and cooling, industrial processes, solar systems, and utilities. The variety of needs served requires that different amounts and types of energy be stored for various duty cycles; thus, several energy storage technologies are needed. The major thrusts of the strategy are to conduct generic and applied research leading to industry's development of the following technologies:

- For transportation--improve the feasibility of electrochemical power sources and flywheel regenerative braking systems to provide the technology for nonpetroleum-based transportation.
- For solar and conventional electric utility applications--electrochemical, thermal, mechanical, magnetic, and underground storage techniques for utility load-leveling applications in order to provide a substitute for natural gas and oil-fired peaking turbines and for use in solar electric systems.

- o For building heating and cooling--aquifer* storage of hot and/or cold water for seasonal use, phase-change thermal storage for daily cycling, and phase-change and chemical heat pump storage for solar uses.

- o For industrial and multipurpose uses--energy-saving electrochemical processes, retrofit thermal storage for industrial heat recovery, and cells to be used in batteries for peak electric demand reduction.

The strategy has been translated into quantitative performance objectives for each technology under development. These objectives are specified in the narrative justification for the two major program areas: (1) Electrochemical Energy Storage and (2) Physical and Chemical Energy Storage. The approach being used to attain these objectives includes:

- o Federal support of research and long-term development in high payoff, high-risk areas where the private sector is unwilling to invest;

- o Cost-shared support with industry of research and long-term development when development risk has been reduced sufficiently that industry is willing to share the cost. For example, industry funded 30% of the program work in FY 1981;

- o Termination of Federal support when the point is reached either where the private sector will assume responsibility to complete development or where chances for success of a particular project diminish as the work proceeds.

Selection of the individual energy storage technologies currently under development in this program has been based on several criteria, including large energy savings payoff if successfully developed, recognition of the proper Government role, industrial interest in the technologies, and a thorough understanding of risks involved with development.

Accomplishments

Specific recent research accomplishments of the program are described below and are categorized according to ultimate end-use. Additional information on the status of projects is presented in the discussion of each energy storage technology category:

Transportation Technologies:

- o Research teams from industry, supported by the National Laboratories, are close to achieving program goals in battery performance for several systems. The systems include: nickel/zinc, nickel/iron, zinc/chlorine, and improved lead-acid. Performance goals range from 41 to 69 Wh/kg (energy density) for up to 1300 cycles (lifetime), depending on the type.

- o The National Battery Test Laboratory (NBTL) at Argonne National Laboratory, where cells and modules developed by research teams undergo verification testing, now operates on continuous basis.

- o For future higher energy density systems, lithium/iron sulfide cells now have shown experimental energy densities up to 100 Wh/kg (vs. 40-65 Wh/kg for the previously mentioned systems), and are being combined into 10-cell modules for laboratory evaluation.

*An aquifer is a water-bearing bed or stratum of permeable rock that contains ground water. For the purpose of this program, an aquifer serves as a storage container for large quantities of hot or cold water or for compressed air.

- A prototype aluminum/air cell (whose "mechanical" recharge feature is similar to gasoline refueling) has been successfully tested at full size with a recrystallizer that removes the products formed on discharge. It has an energy density of 340 Wh/kg. This research is being done by a major aerospace company as a spinoff of its defense work, in collaboration with a National Laboratory and two producers of aluminium.

- The first phase of materials characterizations, along with the laboratory testing and analysis of composite flywheels, has been completed.

- Glass microspheres were evaluated for their possible use as a hydrogen storage medium.

Building Heating and Cooling Technologies:

- Experiments have been completed to test performance of large-scale heat storage devices for solar thermal power generation.

- Life and stability tests of experimental phase-change materials in unique packages have been performed, and the phase-change materials were used in an air-conditioning field test.

- Prototype design and economic studies for a sulfuric acid-water chemical heat pump have been completed, and a residential-size salt-alcohol system was constructed.

- A laboratory-size hydride chemical heat pump has been successfully tested, and a rapid cycling system using waste heat has proceeded into further development.

- The aquifer storage concept has been experimentally verified by engineering contractors at two sites (St. Paul, MN, and Stonybrook, NY), showing high energy recovery rates. Preliminary designs and field studies for three aquifer storage sites have been initiated.

Solar and Conventional Utilities Technologies:

- Construction has been completed on the Battery Energy Storage Test (BEST) facility that will test large-scale utility load-leveling batteries. Installation and check out of test equipment is underway. In FY 1982, this facility will be supported by the Electric Power Research Institute.

- In the exploratory electrochemical technology area, experimental sodium/sulfur cells now exhibit 500-900 cycles (vs. a goal of 2000 for load leveling) and a zinc/bromine power source storing 80 kWh has been assembled for laboratory evaluation.

- A comprehensive battery-testing computer program to simulate photovoltaic energy storage uses has been developed and is being exercised using lead-acid batteries.

- Preliminary design and integration studies, including site selection, have been completed for three large-scale compressed air energy storage units and for one underground pumped unit. The transfer of this technology already has been initiated with several utilities.

- Design and fabrication of a 10 kWh prototype superconducting energy storage magnet have been completed for power stabilization in the Bonneville Power Administration grid.

- A 1 kWh flywheel for a residential photovoltaic application has been successfully tested.

Industrial Technologies:

- A design has been completed and fabrication has begun for the retrofit of a large-scale experiment in heat storage and transport from an aluminum plant near Bellingham, WA, to be used for district heating.

- A 200 kW prototype electrolyzer system using 2.5 ft^2 solid polymer electrolyte cells has been assembled and tested, and a 2 kW bench-scale thermochemical system for production of hydrogen from water has been constructed. In addition, a field test site has been selected and designs have been completed for a hydrogen production unit.

- An analytical study is underway to define whether customer-owned battery storage for industrial and small business areas would achieve a significant peak electric demand reduction and thus an oil saving. This work is jointly sponsored by the New York Energy Research and Development Authority and DOE for the New York City subway system.

- To reduce energy consumption in electrolytic process industries, air cathodes (for chlor-alkali) and hydrogen anodes (for zinc refining) are being experimentally developed and tested in full-size electrolytic cells.

The Electrochemical and the Physical and Chemical Energy Storage programs are two of the three research and development thrusts of the Office of Advanced Conservation Technologies, reporting to the Office of the Deputy Assistant Secretary for Conservation. The third thrust, designated as the Energy Conversion and Utilization Technologies (ECUT) activities, relates to the specific technologies appropriate to its title. The FY 1982 budget request for this activity appears under the heading "Multi-Sector."

The FY 1982 request for the Energy Storage Research and Development Program includes funds to support cross-cutting multiprogram activities, such as policy, planning, evaluation, budget, management, and resource applications.

Energy Storage Research and Development
Operating Expenses
Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1980 Appropriation	FY 1981* Appropriation	FY 1982 Base	FY 1982 Request
Energy Storage Systems				
Electrochemical Energy Storage:				
Operating expenses	$32,000	$37,800	$37,800	$25,550
Capital equipment	1,100	700	700	700
Subtotal	33,100	38,500	38,500	26,250
Physical and Chemical Storage:				
Operating expenses	$30,840	$31,300	$31,300	$11,850
Capital equipment	1,060	1,000	1,000	400
Subtotal	31,900	32,300	32,300	12,250
Program direction	$1,302	1,000	$1,000	500
Total:				
Operating expenses	$64,142	$70,100	$70,100	$37,900
Capital equipment	2,160	1,700	1,700	1,100
Total, Energy Storage Systems	$66,302	$71,800*	$71,800	$39,000

*Does not reflect a $19,900,000 rescission, which is proposed for FY 1981 and is addressed in a separate table.

Authorization: Sec. 4, P.L. 93-577, the Federal Nonnuclear Energy Research and Development Act of 1974.

Summary of Changes

FY 1981 Appropriation enacted	$71,800
FY 1982 Base	71,800
Program Increases and Decreases For FY 1981-82	
Electrochemical Energy Storage	
-Reduce solar applications	-2,450
-Eliminate third generation electric vehicle analysis and reduce mobile applications (near-term batteries) support to P.L. 94-413	-4,100
-Eliminate dispersed applications work on utility-owned storage	-5,700
Subtotal Decrease	-12,250
Physical and Chemical Energy Storage	
-Reduce thermal storage development for waste heat use	-3,400
-Eliminate hydrogen technology development and reduce efforts on chemical heat pumps	-5,150
-Eliminate flywheel development for solar and reduce technology R&D for vehicles	-1,900
-Eliminate aquifer thermal storage engineering projects	-3,700
-Eliminate underground pumped hydro and advanced compressed air technology R&D	-2,300
-Eliminate large-scale magnetic storage R&D and delay small-scale technology development	- 900
-Eliminate mechanical storage applications	- 400
-Eliminate Technical and Economic Analysis Subprogram	-1,700
-Reduce Capital Equipment	- 600
Subtotal Decrease	-20,050
Program Direction	
-Eight-staff year decrease	- 500
FY 1982 Budget Request	$39,000

ELECTROCHEMICAL ENERGY STORAGE

	FY 1981 Appropriation	FY 1982 Base	FY 1982 Requested
Electrochemical Storage	$38,500	$38,500	$26,250

The FY 1982 budget request for this activity is $26,250,000, which reflects a decrease of $12,250,000 from the amount appropriated in FY 1981. The request represents a $1,050,000 decrease from the proposed FY 1981 funding level. This request includes $700,000 for capital equipment acquisition in support of planned subprogram activities. Most of the decrease appears in dispersed battery applications and similar program areas where it is judged that industry can utilize the technologies without further Government support.

The goals of this program are to ensure that electrochemical technologies are available that will permit orderly development of electrochemical power sources for eventual use in transportation, solar, and electric network systems and to provide related technologies that will result in other energy and resource savings in the industrial sector. The basic authorization for the work is embodied in the Federal Nonnuclear Energy Research and Development Act of 1974 (P.L. 93-577). The electrochemical storage activities also support research and development related to the Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978 (P.L. 95-590).

The electrochemical energy storage activities are divided into three subprograms. The activities are briefly described (more fully in subsequent text), and their objectives and current status are summarized in the following tabulation.

Summary of Subprogram Activities

SUBPROGRAM/ELEMENT AND MISSION	GOALS AND TARGET DATE	STATUS
I. Technology Base Research		
Provide sound technology base for new electrochemical systems development		
IA. Supporting Research --		
Conduct research and studies in electrochemistry and new materials; investigate failure modes	Provide new concepts and materials for other program elements on a continuing basis	New electrolytes for electrochemical systems to be tested; zinc electrolyte mechanisms under study.
IB. Electrochemical Systems Research --		
Explore new electrochemical systems to establish technical feasibility	Advance to exploratory technology development or terminate, as results dictate	Zn/Br electrochemical system advanced to prototype development. Metal/air and fuel cells being developed.
IC. Electrolytic Technology --		
Develop electrochemical technologies for energy & resource savings and solar and nuclear missions.	Improve chlor-alkali process efficiency by 40%. Prove feasibility of electrolytic technologies.	One year life air electrode obtained for chlor-alkali cells and hydrogen electrode for zinc cells. Both to be transferred to industry in 1982.

SUBPROGRAM/ELEMENT AND MISSION	GOALS AND TARGET DATE	STATUS
II. Exploratory Technology Development		
Proceed with information developed in technology base & transfer R&D results to industry.		
IIA. Aqueous Systems --		
Long-life, low-cost, efficient electrochemical systems for load-leveling & other dispersed electric missions.	2000 cycles, 10-yr predicted life, 70% efficiency $40/kWh	Reduce battery modules on tests, Zn/Br developer tests of 8 kWh modules.
IIB. Non-aqueous Systems --		
High power and energy density for a range of applications.	1000 cycles, 5-yr predicted life, 70% efficiency, $60 kWh	Na/S cell obtained 500-900 cycles. Li/MS obtained 100 Wh/kg.
III. Applications Research & Development		
Maintain technology base; transfer results of R&D to industry		
IIIA. Mobile Applications --		
Manage development of ambient temperature systems for vehicular application and evaluate their performance at the National Battery Test Laboratory.	Improve energy density and cycle life in statistically meaningful groups of cells in FY 1982.	Single cell results to date: lead-acid 41 Wh/kg and 800 cycles; nickel/iron 48 Wh/kg and 400 cycles.
IIIB. Solar Applications --		
Specify batteries required for solar missions and develop those not in the present exploratory technology development program	Define electrochemical storage systems needs for solar-electric missions.	Stand-alone and photovoltaic residential electrochemical systems needs defined; Zn/Br and redox modules on test.
IIIC. Dispersed Battery Applications --		
Evaluate customer-side-of-the-meter storage using existing or future technologies	Transfer results of R&D to industry in 1982	Analysis studies being performed.

Work planned in each of the above supporting elements of the Electrochemical Energy Storage Program area for FY 1982 is summarized in subsequent paragraphs.

Technology Base Research

The Supporting Research element develops the electrochemical research and engineering base for use in power source development and provides the basis for major improvements in electrochemical technology. Activities in this element support research and development efforts that help guide the most effective introduction of the long-term systems being developed at present, carry out long-term research aimed at the attainment of a better understanding of generic problems, and support exploratory investigations of radically new alternatives. While battery manufacture involves a mature technology, this maturity is more in terms of years than in terms of sophistication. Battery development has relied on largely empirical techniques for developing the next generation of devices. There has not been any battery designed to achieve both high performance and long life because the fundamental details of battery electrode operation are not yet completely understood. The supporting research element is formulated to provide this understanding.

Research to establish scientific and engineering data generally includes the determination of the chemical thermodynamics and kinetics of electrode reactions, determination of the properties of electrolytes required for engineering calculations, and analysis and simulation of electrochemical systems. In FY 1982 support includes research on the rechargeability of zinc electrodes (the life-limiting component of nickel/zinc and in zinc/halogen batteries) and on alkaline aqueous systems. Support for non-aqueous electrochemical systems in FY 1982 includes work on both positive and negative electrodes, on molten salt electrolytes, and on thermal controls. New electrochemical systems being studied in FY 1982 include low-temperature fused salt systems, all solid-state systems with ceramic or polymeric electrolytes, and non-aqueous ambient-temperature lithium-based systems. These systems have the potential for lower cost and longer life while obtaining higher power and energy densities than more conventional systems.

The objective of the Electrochemical Systems Research element is the exploration of new, higher performing, lower cost electrochemical storage systems. This area supports mobile and the solar and dispersed electric load-leveling missions.

For metal/air power sources, a 3 kW multicelled aluminum/air module will be constructed and tested, and the design of mechanically rechargeable cells will begin in FY 1982. Research on bifunctional air electrodes (capable of operating in both the charge and discharge mode) will continue in FY 1982. Work will continue on the bifunctional air electrode because that is the life-limiting component of iron/air batteries. In iron/air systems, the energy density will be 100 Wh/kg.

Research on fuel cells for ultimate use in a variety of transportation applications was initiated in FY 1981. Applied research on an acid electrolyte fuel cell, initiated in FY 1981, will continue in FY 1982.

Sodium/sulfur tests with NASICON (a sodium super-ionic conductor), an attractive new electrolyte for sodium/sulfur cells, have been delayed because the first tubes produced had free zirconia present as a separate phase. This compound is subject to attack by molten sodium. NASICON inert to attack by molten sodium is now being made. In FY 1982 sodium/sulfur cells will be built with the new electrolyte, and performance will be compared to current beta-alumina cells.

The objective of the Electrolytic Technology element is the development of energy-efficient electrolytic processes for ultimate use in industrial applications, fuel cells, metal/air cells, and cell processes. This objective will be achieved by increasing basic understanding of current and new electrochemical processes, assessing the merit and probability of the use of improved processes or alternatives, and developing electrochemical technology that will save energy and/or resources. Work was initiated in previous years to develop an air cathode for chlor-alkali cells (used commercially to produce chlorine and sodium hydroxide), to develop a hydrogen anode for zinc winning cells, and to improve the process used in the production of aluminum. Both of these electrodes will be transferred to industry in 1982.

Studies will be carried out on recycling expensive and critical battery materials, on regeneratively recharged cells, and on oxidation and reduction phenomena at fuel cell electrodes.

Exploratory Technology Development

Desirable battery attributes are cost, performance, life, durability, safety, and environmental considerations. The performance factors that play the most important role in battery characterization are: specific energy, energy density, specific power, system life (cycle life), efficiency, ease of replacement, and repair cost. Energy and power density are initial factors for vehicular applications while long life and low cost are the most important characteristics for stationary storage applications. Two broad classes of systems are under development in FY 1982: high-temperature non-aqueous systems (such as sodium/sulfur and lithium/metal sulfide) and flow systems (such as zinc/halogen and Redox).

For the sodium/sulfur system, cells now exhibit 500-900 charge/discharge cycles (vs. 2000 required for load-leveling) and, following the successful incorporation of a new seal, can repeatedly be thermally cycled between ambient and operating temperature. A 100 kWh system is under construction and will be tested in 1981. In FY 1982, continued improvements in cell life will be made, and additional multicell modules will be built and tested.

For the lithium/iron sulfide system, full-size multiplate cells now demonstrate specific energies up to 100 Wh/kg (vs. 40-65 Wh/kg for available systems) and lifetimes of 300-400 cycles (vs. 800). In 1981, 10-cell modules will be fabricated and tested. In FY 1982, efforts will continue on improving life (to 600-800 cycles), evaluating lower cost designs, improving specific energy, and constructing additional multicell modules.

Flow systems (such as zinc/chlorine, zinc/bromine, and redox systems) employ aqueous electrolytes operating close to ambient temperature, use inexpensive active materials, and work with inexpensive electrodes substrates, look most economically attractive in bipolar cell-stack configurations requiring two well-separated cell components and need flowing electrolytes in both cell components. Work is progressing in FY 1981 to obtain all of these component characteristics. These systems are more than just a set of battery plates but have, in addition, pumps, tanks, connective plumbing, controls, which must be designed into a long-life, cost-effective system. Work on thermal management, flow, and efficiency will be carried out in FY 1982 on modules of redox and Zn/halogen systems.

For the zinc/bromine system, 8 kWh modules are currently under test, and an 80 kWh module is under construction. In 1981, the 80 kWh system will undergo thorough testing while, simultaneously, improvements in cell design and performance are being developed. During FY 1982, information learned from the 80 kWh system will be combined with the improvements in cell technology, and new multicell modules will be constructed and evaluated.

Applications Research & Development

The Mobile Applications program element is managed by the Office of Advanced Conservation Technologies (ACT) and is funded both by the Office of Transportation Programs (TP) and ACT. ACT funding supports the management, operation, and equipping of the National Battery Test Laboratory where full-size cells and modules are evaluated under uniform test conditions. TP funding supports industrial contractor battery technologies.

Under the Solar Applications program element, research and development for specific solar mission areas is conducted. The primary solar applications for batteries are in photovoltaic energy conversion systems. Other solar missions that may benefit from electrochemical storage technology include: Solar Thermal and Wind Energy Conversion Systems.

The Department of Energy's photovoltaic program in the Office of Solar Applications for Buildings is developing a spectrum of systems for the photovoltaic mission. These include remote site, single residence, multiple residence, commercial/industrial, and central station applications. The Solar Applications element, in coordination with other on-going program efforts, is developing long-life and cost-effective storage systems for the various photovoltaic applications. The storage milestones have been established to coincide with the photovoltaic program objectives. The program is also time phased to meet the needs of stand-alone wind and solar thermal electric programs.

In FY 1982, laboratory evaluation and testing of electrochemical systems in conjunction with photovoltaic systems will be carried out to refine storage systems designs for specific dispersed and solar applications. In such applications, the storage system must be capable of (1) rapid and frequent changes from charge to discharge mode and vice versa; (2) efficient operation in charge and discharge modes at different depths of discharge; and (3) idle stand at partial charge without loss of capacity.

CAPITAL EQUIPMENT

Approximately $700,000 is requested for this subprogram, primarily for support of technology base projects. For example, equipment is needed to analyze in-situ electrochemical processes and automatic cycles. Also, data monitoring equipment is needed to evaluate electrochemical cells and systems.

PHYSICAL AND CHEMICAL ENERGY STORAGE

	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Physical and Chemical Storage	$32,300	$32,300	$12,250

The FY 1982 budget request for this program area is $12,250,000, which is a decrease of $20,050,000 from the amount appropriated in FY 1981 and $11,350,000 from the proposed FY 1981 funding level. The proposed funding level reflects program efforts to focus on long-term program efforts to research, development, and technology base with anticipated high risk payoff. This request includes $400,000 for capital equipment acquisition in support of planned subprogram activities. Activities with near-term commercialization potential will be left to the private sector.

The goal of this program is to help the private sector develop advanced technologies that store thermal, chemical, mechanical, underground, and magnetic energy for use in buildings, industry, and electric power generation. The technologies will enhance use of intermittent sources (such as solar) to supply constant uses (such as electric power). Conversely, the new technologies facilitate the use of constant energy sources (such as industrial waste heat) to supply intermittent uses (such as seasonal building heating). The same storage technologies are needed for dispersed uses, such as solar heating and cooling and industrial process heat. These technologies are also attractive for storage at large central facilities, such as a baseload electric powerplant.

The Physical and Chemical Storage activities are divided into five subprograms: thermal, chemical, mechanical, underground, and magnetic.

The authorizations for this program area are the Federal Nonnuclear Energy Research and Development Act of 1974 (P.L. 93-577) and the enabling legislation for the Department of Energy (P.L. 95-91).

The major activities in FY 1982 in each subprogram are shown in the table below along with a summary of objectives and current status.

Summary of Subprogram Activities

SUBPROGRAM/ELEMENT AND MISSION	GOALS AND TARGET DATE	STATUS
I. THERMAL STORAGE		
IA. Daily storage for solar heating and cooling	Mid 1980's: $5 to $10/kWh thermal	Residential tests in progress
IB. Residential heat storage for daily electricity peak leveling	Mid 1980's: $10/kWh to thermal with 90% efficiency	Residential tests completed
IC. Storage for solar thermal power generation	Mid 1980's: $5/kWh thermal, 2-10 hr storage, 30 yr service life	Molten salt devices developed
ID. Heat transport	1990: $0.05/MWh-Km thermal transport cost	Assessments completed
II. CHEMICAL STORAGE		
IIA. Chemical heat Pumps	1990: $5 to $10/kWh thermal	Two prototypes fabricated

SUBPROGRAM/ELEMENT AND MISSION	GOALS AND TARGET DATE	STATUS
III. MECHANICAL/FLYWHEEL STORAGE		
IIIA. Flywheels for transportation, industrial, residential uses	1990: $0.05 to $0.10 per kWh electric (output)	1/10 scale residential unit tested
IV. UNDERGROUND STORAGE		
IVA. Seasonal aquifer storage for building heating & cooling	1990: $0.04 to $0.10/kWh thermal with 75% heat recovery	Evaluation of three sites completed
V. MAGNETIC STORAGE		
VA. Transmission line stabilizing magnetic storage device	Mid-term, 90% efficiency, 10 kWh electric optional size	Fabrication in progress

Subprogram Summaries

Thermal Storage

The specific goals of the thermal storage subprogram are to help the private sector develop customer-side-of-the-meter thermal storage, bulk storage for district heating and phase-change heat storage for solar heating and cooling of small buildings.

- Storage for Buildings: During FY 1981, phase-change materials for the storage of both heat and cool were selected. In FY 1982, research will continue on incorporation of these materials into storage devices for active solar heating and cooling. For passive solar heat storage in building materials, the development of phase-change substances will continue. Design studies will be conducted on building heating systems that use waste heat recovery, storage, and transport technology. As a part of this activity, a small-scale heat exchanger for waste heat recovery will be tested at an aluminum plant near Bellingham, WA.

- Solar Thermal Systems: Technology support for solar thermal power includes development of improved storage materials, together with heat transfer and long-distance heat transmission technology. Projects that will be supported in FY 1982 include storage coupled to liquid metal receivers and parabolic dish-Stirling engines. Work will continue on direct contact heat exchange processes and thermochemical reactions for heat transport. The first phase of a project on internally insulated pipes for heat transport will be completed.

Chemical Storage

The chemical heat pump activity focuses on technology developments for space conditioning and industrial process heat. In the longer term the technology ties to solar collectors and space conditioning markets.

The requested FY 1982 funding will support continuation of research on two types of chemical heat pump systems. One is designed mainly to upgrade industrial waste heat, and the other has advantages in rapid cycling capability for air-conditioning.

Mechanical/Flywheel Storage

The goal of this subprogram is to provide a technology base from which the private sector can develop high performance flywheels with the ability to store and expend energy.

Successful use of flywheels in applications such as vehicles depends primarily on the availability of improved component technologies. The requested funds will be used primarily to fabricate and test two second generation flywheel rotors, for fatique property data, upgrade the flywheel test facility, design a flywheel containment structure, and perform high-temperature tests of flywheel materials with emphasis on safety research. Approximately 70 percent of the requested funds will be spent by industries and universities.

Underground Storage

The goal of this subprogram is to determine reservoir stability for compressed air storage and to validate experimentally the concept of seasonal thermal energy storage.

- Compressed Air: In FY 1982, a field experiment on the storage of high-pressure air in an underground porous aquifer will be continued in order to verify this storage concept. Funds requested will allow continuing an air injection and recycling experiment (reservior geology) in a porous aquifer in western Illinois over an extended period of tiime. The data will permit configuration of modification of an analytical model already developed.

- Seasonal Energy Storage: The major emphasis of this work is toward the development of technology for storing hot and cold water in aquifers for economical capture and reuse of energy of opportunity, such as industrial waste heat, cogenerated heat, or winter chill. Funds requested are for the continuation of laboratory and field experiments at two sites to obtain technical performance data and systems design criteria. No demonstration or engineering projects are planned.

Magnetic Storage

The magnetic storage subprogram has as its goal the design and installation of a small-scale storage system to damp out short-term electric current oscillations for stabilization of utility transmission lines.

The Bonneville Power Administration (BPA) is designing and building a 10 kWh superconducting magnetic storage device for placement on their BPA grid to obtain data on transmission line stabilization. During peak conditions it will allow 25 percent more (3000 vs. 2400 kW) electric power generated by hydro facilities to be transmitted to California to replace peaking power generated by burning oil. By the end of FY 1981 the key parts of the device will have been constructed. In FY 1982 evaluation will be conducted at the Los Alamos National Laboratory. The evaluation will include performance under computerized control.

Capital Equipment

The thermal subprogram will require data acquisition and monitoring equipment for field tests and thermophysical property measurement instruments for the testing of phase-change materials. Geochemical and geophysical monitoring instrumentation will be required for underground seasonal energy storage tests and the aquifer compressed air injection field experiment. The mechanical subprogram will require an expansion of the flywheel test facility at Oak Ridge National Laboratory to conduct parallel tests of long-term fatigue and energy density at burst of experimental flywheels. Approximately $400,000 is being requested for these purposes in FY 1982.

	FY 1981 Appropriation	FY 1981 Base	FY 1982 Request
Program Direction	$1,000	$1,000	$500

This funding request supports 12 full-time permanent positives and 14 full-time equivalent staff-goals. The request of $500,000 represents a decrease from the FY 1981 base.

Cost-Benefit Analysis

The potential market for energy storage is very large. Its use will affect portions of the transportation, buildings, utility, and industrial sectors. Successful development and commercialization of the storage technologies could lead to annual scarce fuels (oil and gas) of about 2.8 quads in the year 2000; the annual energy savings of all forms of energy are estimated to be about 2 quads in the year 2000. These savings are directly attributable to the DOE R&D effort and do not include the private sector contribution.

DOE/CR-0011/3
VOLUME 4 of 7

REVISED CONGRESSIONAL BUDGET REQUEST

FY 1982

VOLUME 4

GENERAL SCIENCE AND RESEARCH
URANIUM ENRICHMENT
GEOTHERMAL RESOURCES DEVELOPMENT FUND

FEBRUARY 1981
U.S. DEPARTMENT OF ENERGY
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

NOTE: Only those pages from Volume 4 of the DOE FY 1982 Revised Congressional Budget Request, pertaining to Conservation and Renewable Energy programs, have been included herein.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

URANIUM ENRICHMENT

GEOTHERMAL RESOURCES DEVELOPMENT FUND

VOLUME 4

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FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic energy defense activities - operating expenses..	2,408,247	2,384,833	2,952,335	2,861,462	3,728,828	3,598,018
Atomic energy defense activities - plant and capital equipment.....	590,549	482,201	665,305	708,027	1,271,372	1,019,229
General science and research - operating expenses.....	339,663	344,573	378,015	372,000	439,160	436,460
General science and research - plant and capital equipment.....	130,000	124,198	126,400	138,347	128,300	136,690
Energy supply research and development - operating expenses..	2,211,559	2,281,578	2,376,988	2,369,968	2,123,158	2,161,000
Energy supply research and development - plant and capital equipment.....	432,728	461,026	397,587	427,534	342,381	426,000
Uranium supply and enrichment activities.	243,632	242,809	31,755	196,245	164,442	-120,528
Federal energy regulatory commission	68,967	67,088	74,374	77,082	82,173	80,849
Geothermal resources development fund....	181	660	1,301	2,500	200	1,500

Department of Energy

Proposed Appropriation Language

Geothermal Resources Development Fund

[GEOTHERMAL LOAN GUARANTEE AND INTEREST ASSISTANCE PROGRAM]

[For carrying out the Loan Guarantee and Interest Assistance Program as authorized by the Geothermal Energy Research, Development and Demonstration Act of 1974, as amended, $1,284,000, to remain available until expended: Provided, That the indebtedness guaranteed or committed to be guaranteed through funds provided by this or any other appropriation Act shall not exceed the aggregate of $500,000,000: Provided further, That no part of this or any other appropriation for the purpose of the Loan Guarantee and Interest Assistance Program shall be available for obligation for loan guarantees or interest assistance contracts entered into after September 2, 1984: Provided further, That notwithstanding provisions in Public Law 94-355; Public Law 95-96 and Public Law 96-69 to the contrary, such portion of the funds previously appropriated for the Geothermal Loan Guarantee and Interest Assistance Program as are required to secure outstanding loan guarantee obligations for those loans still in force as of September 2, 1984, may remain available for obligation after that date for payment of valid claims against the program for a period not in excess of thirty years] For administrative expenses of the Geothermal Resources Development Fund, $200,000 to remain available until expended.

Explanation of Changes

Language proposes that all funds appropriated remain available until expended.

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

GEOTHERMAL RESOURCES DEVELOPMENT FUND

	FY 1980 Actual	FY 1981 est.	FY 1982 est.
Executive level I	—	—	—
Executive level II	—	—	—
Executive level III	—	—	—
Executive level IV	—	—	—
Executive level V	—	—	—
Subtotal	—	—	—
ES-6	—	—	—
ES-5	—	—	—
ES-4	—	—	—
ES-3	—	—	—
ES-2	—	—	—
ES-1	—	—	—
Subtotal	—	—	—
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—	—	—
GS-18	—	—	—
GS-17	—	—	—
GS-16	—	—	—
GS/GM-15	2	3	3
GS/GM-14	1	—	—
GS/GM-13	—	—	—
GS-12	1	—	—
GS-11	—	—	—
GS-10	—	—	—
GS-9	—	—	—
GS-8	—	1	1
GS-7	—	1	1
GS-6	1	—	—
GS-5	—	—	—
GS-4	—	—	—
GS-3	—	—	—
GS-2	—	—	—
Subtotal	5	5	5
Ungraded	—	—	—
Total permanent positions	5	5	5
Unfilled positions, end of year	—	—	—
Total permanent employment end of year	5	5	5

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

GEOTHERMAL RESOURCES DEVELOPMENT FUND

(In thousands of dollars)

	FY 1981	FY 1982
Appropriation	$ 1,284	$ 200
Proposed Supplementals and Rescissions:		
Rescission	-22,066	0
Subtotal	-20,782	200
Comparative Transfer To:	0	0
Comparative Transfer From:	0	0
Subtotal, Budget Authority	-20,782	200
Receipts and Reimbursements:		
Offsetting Collections	1,600	2,500
Unobligated Balances, Start of Year	42,233	1,750
Unobligated Balances, End of Year	- 1,750	- 4,250
Total, Obligations	$ 21,301	$ 200

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
GEOTHERMAL RESOURCES DEVELOPMENT FUND
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Loan Evaluation Fund..	---	727	1,091	2,307	---	1,300
Program Direction.....	181	143	193	193	200	200
Subtotal, Geothermal Resources Development Fund.....	181	870	1,284	2,500	200	1,500
Cost Outlay Adjustment.....	---	-210	---	---	---	---
Subtotal, Geothermal Resources Development Fund.....	181	660	1,284	2,500	200	1,500
Proposed Rescission.....	---	---	-22,066	---	---	---
Total, Geothermal Resources Development Fund.....	181	660	-20,782	2,500	200	1,500

Geothermal Resource Development Fund

The Geothermal Loan Guaranty Program is authorized under the Geothermal Energy Research, Development and Demonstration Act of 1974 (Public Law 93-410), as amended by the Department of Energy Act of 1978 - Civilian Applications (Public Law 95-238). FY 1982 budget request for the program is $200,000.

The purpose of the program is to accelerate the commercial development and utilization of geothermal energy. Loan Guaranties approved under this program are expected to minimize a lender's financial risk so that credit can be made available for the construction and operation of geothermal projects; to develop normal borrower-lender relationships which will in time create a flow of credit to the geothermal industry without the need for loan guaranties; to enhance competition and to encourage new entrants into the geothermal market; and to demonstrate the commercial viability of several geothermal resource areas by establishing a variety of geothermal utilization projects. Loans currently guarantied are expected to result in the addition of 274 MWe of new generating capacity from geothermal resources.

FY 1980/1981 Accomplishments

- Five loans for field exploration, development, and power plant construction projects amounting to $91,048,000 were guarantied in FY 1980.
- A guaranty application for $45,000,000 was approved and closed in FY 1981.

FY 1982 Expected Accomplishments

The program is being phased out in FY 1982; however, $200,000 is being requested for program direction of existing loan guaranty projects. The proposed FY 1981 rescission action eliminates the reserve for loan defaults. In the event of default a supplemental request will be required. Income of about $2,500,000 will be realized by the Department of Energy for the reserve fund through the payment by borrowers of guaranty fees of the guarantied debt outstanding.

In FY 1981, $500,000,000 in cumulative aggregate loan authority was authorized for the Geothermal Resources Development Fund. Guaranties awarded to date amount to $136,000,000.

Geothermal Resources Development Fund
Geothermal Resources Development Fund
(Tabular dollars in thousands. Narrative in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Geothermal Resources Development Fund				
Guarantee reserve fund				
Operating expenses	$ 0	$ 0	$ 0	$ 0
Subtotal	0	0	0	0
Loan evaluation fund				
Operating expenses	0	1,091	1,091	0
Subtotal	0	1,091	1,091	
Program direction				
Operating expenses	181	193	193	200
Subtotal	181	193	193	200
Total				
Operating expenses	181	1,284	1,284	200
Geothermal Resources Development Fund	$181	$ 1,284*	$ 1,284	$ 200

* Proposed rescission will reduce the FY 1981 appropriation by $22,066,000.

Authorization: Title II, P.L. 93-410. Title VI, P.L. 96-294

Summary of Changes
Energy Supply Research and Development
(dollars in thousands)

FY 1981 Appropriation enacted	$ 1,284
Built in increases and decreases:	
FY 1982 base	$ 1,284
Program increases and decreases:	
Guarantee reserve fund	
	0
Subtotal	$ 0
Loan evaluation fund	
Subtotal	- 1,091
Program direction	
Subtotal	+ 7
FY 1982 budget request	$ 200

Geothermal Resource Development Fund

FY 81 Appropriation	FY 82 Base	FY 82 Request
$1,284	$1,284	$200

Guaranty Reserve Fund

The total Fiscal Year 1982 budget request of $200,000 contains no funding for the Guaranty Reserve Fund. During FY 1980 it was necessary to set aside $20,000,000 from the fund to pay the expected future value of interest differential assistance to a municipal borrower. A proposed FY 1981 rescission will remove all other remaining monies from the Guaranty Reserve Fund. No new loans will be guarantied. If any defaults do result from existing loans, a budget supplemental will be requested.

Loan Evaluation

The FY 1982 budget requests has no funds for loan evaluation since no new loan guaranties will be granted in FY 1982.

To date, six loan guaranty applications including one refinancing have been approved for projects located in California and Nevada. The three projects located in California are for the purpose of reservoir exploration, testing and field development. The objective of these projects is to supply energy equivalent to a total of 160 MWe. These projects are proceeding on schedule. One project located in the Geysers in California is for the construction of a 110 MWe power plant for a consortium of Northern California cities. The one project located in Nevada represents the first commercial application of geothermal heat used to dry crops. The food drying plant became operational in September 1978 and at that time became the first project financed through the geothermal loan guaranty program to become a viable business venture and a model for others in the food drying industry.

Program Direction

The request of $200,000 will support 5 positions in Headquarters. This staff comprises the mix of skills necessary for (1) implementation and management of program operation procedures, (2) provision of governmental oversight over all associated operations, (3) management of contracts awarded in conjunction with program objectives, (4) coordination of interagency cooperative efforts, (5) program planning and budgeting, and (6) preparation of draft legislation and reports mandated by public laws or by Congressional oversight committees.

DOE/CR-0011/3
VOLUME 5 of 7

REVISED CONGRESSIONAL BUDGET REQUEST

FY 1982

VOLUME 5

POWER MARKETING ADMINISTRATIONS
SPECIAL FOREIGN CURRENCY
DEPARTMENTAL ADMINISTRATION

FEBRUARY 1981
U.S. DEPARTMENT OF ENERGY
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

NOTE: Only those pages from Volume 5 of the DOE FY 1982 Revised Congressional Budget Request, pertaining to Conservation and Renewable Energy programs, have been included herein.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

DEPARTMENTAL ADMINISTRATION

VOLUME 5

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Geothermal resources development fund....	181	660	1,301	2,500	200	1,500

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Alaska power administration - operations and maintenance.....	2,660	2,439	3,069	3,069	3,538	3,488
Bonneville power administration.....	---	-19,144	---	16,700	136,180	-189,200
Southeastern power administration - operations and maintenance.....	1,400	1,337	1,552	1,544	7,237	6,926
Southwestern power administration - operations and maintenance.....	32,180	16,223	28,208	37,208	21,269	29,269
Western area power administration - construction, rehabilitation, operations, and maintenance.....	122,800	105,627	138,502	138,502	210,774	210,774
Emergency fund Western area power administration.....	200	219	200	347	500	500
Colorado River Basin power marketing fund.....	5,152	-29,976	3,548	-9,564	---	-2,597
Departmental administration.....	210,099	224,894	231,068	230,003	273,031	272,230
Special foreign currency.....	---	31	---	---	---	---
Subtotal, Appropriations Before the Energy and Water Development Subcommittees:	6,800,017	6,690,616	7,410,207	7,570,974	8,932,543	8,070,608
Supplementals	---	---	106,480	97,709	---	9,271
Rescissions.....	---	---	-167,832	-116,673	---	-29,403
Total, Appropriations Before the Energy and Water Development Subcommittees .	6,800,017	6,690,616	7,348,855	7,552,010	8,932,543	8,050,476

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil energy research and development.....	732,536	714,219	711,435	729,467	417,340	440,617
Fossil energy construction.....	103,250	76,385	423,300	244,989	18,000	94,700
Energy production, demonstration, and distribution.....	111,701	138,872	226,062	238,026	230,963	283,800
Energy conservation...	780,668	574,216	864,507	754,893	195,000	751,545
Alternative fuels production.....	6,263,000	26,487	---	200,000	---	100,000
Strategic petroleum reserve.....	190	342,008	1,485,000	2,415,228	3,883,408	2,456,738
Strategic petroleum reserve - entitlements.....	---	---	1,845,390	540,168	---	---
Energy information administration.....	90,773	75,263	104,117	101,772	80,000	80,000
Economic regulation...	150,955	132,415	176,867	176,920	28,500	40,400
Subtotal, Appropriations before the Interior and Related Agencies Subcommittee:	8,233,073	2,079,865	5,836,678	5,401,463	4,853,211	4,247,800
Supplementals.....	---	---	1,305,507	91,470	---	1,214,037
Rescissions.....	---	---	-2,283,346	-433,620	---	-465,022
Total Appropriations Before the Interior and Related Agencies Subcommittees:	8,233,073	2,079,865	4,858,839	5,059,313	4,853,211	4,996,815
Subtotal, DOE.....	15,033,090	8,770,481	12,207,694	12,611,323	13,785,754	13,047,291

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Permanent - Indefinite Appropriations:						
Southeastern power administration - continuing fund ..	---	---	---	---	---	---
Southwestern power administration - continuing fund ..	---	107	---	---	300	---
Payments to states .	40	283	85	125	85	85
Spent fuel storage fund	---	---	---	---	---	---
Total Federal Funds, Department of Energy.....	15,033,130	8,770,871	12,207,779	12,611,448	13,786,139	13,047,376
RECAP						
New Budget Authority	15,033,130	8,770,871	13,246,970	12,972,562	13,786,139	12,318,493
Supplementals.....	---	---	1,411,987	189,179	---	1,223,308
Rescissions.....	---	---	-2,451,178	-550,293	---	-494,425
Total DOE, Federal Funds.....	15,033,130	8,770,871	12,207,779	12,611,448	13,786,139	13,047,376
Other Funds:						
Advances for cooperative work	5,348	-31,807	44,188	53,379	39,100	39,100

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF FULL-TIME PERMANENT POSITIONS AND STAFF YEARS BY APPROPRIATION

	FY 1980 Actual		FY 1981 Estimates		FY 1982 Request	
	Positions	FTE	Positions	FTE	Positions	FTE
Total Estimates before the Energy and Water Development Subcommittee						
Headquarters	5,375	5,371	5,374	5,355	5,380	5,406
Field	9,156	9,139	9,458	9,264	9,570	9,505
Subtotal	14,531	14,510	14,832	14,619	14,950	14,911
Estimates before the Interior Subcommittee						
Headquarters	2,347	2,385	2,134	2,589	1,391	1,630
Field	2,949	2,877	2,605	2,460	1,319	1,384
Subtotal	5,296	5,262	4,739	5,049	2,710	3,014
Total Department of Energy						
Headquarters	7,722	7,756	7,508	7,944	6,771	7,036
Field	12,105	12,016	12,063	11,687	10,889	10,889
TOTAL	19,827	19,772	19,571	19,668	17,660	17,925

DEPARTMENT OF ENERGY
FY 1982 BUDGET STAFFING DISTRIBUTION
BY APPROPRIATION

	FULL-TIME PERMANENT					
	FY 1980		FY 1981		FY 1982	
	POS	FTE	POS	FTE	POS	FTE
DOE APPROPRIATION SUMMARY:						
0XXX ATOMIC ENERGY DEF ACTIV	2103	2115	2295	2163	2295	2272
AEDA HEADQUARTERS	357	354	394	377	399	396
AEDA FIELD	1746	1761	1851	1785	1896	1876
1XXX GENERAL SCIENCE & RESEARCH						
GSR HEADQUARTERS	22	20	25	25	28	23
2XXX ENERGY SUPPLY R & D	1265	1250	1284	1245	1106	1177
ESRD HEADQUARTERS	898	880	836	871	808	815
ESRD FIELD	385	384	368	374	338	362
3XXX URANIUM ENRICHMENT	175	186	174	173	168	172
UE HEADQUARTERS	74	79	76	75	83	80
UE FIELD	101	107	98	93	85	92
45XX FOSSIL ENERGY R & D	1302	1325	1232	1232	1075	1104
FERD HEADQUARTERS	245	252	267	265	270	270
FERD FIELD	1057	1078	965	966	805	834
56XX EN PROD, DEMO, & DISTR	285	291	263	259	129	197
EPDD HEADQUARTERS	189	194	169	167	29	99
EPDD FIELD	95	97	94	92	100	98
57XX ENERGY CONSERVATION	585	599	396	585	252	328
EC HEADQUARTERS	351	320	276	365	192	208
EC FIELD	234	279	120	120	120	120
5614 STRATEGIC PETR RES DEF	184	198	190	197	200	198
SPRO HEADQUARTERS	59	59	59	59	56	55
SPRO FIELD	125	139	131	123	144	142
68XX ENERGY INFO ADMIN	779	779	705	740	520	513
EIA HEADQUARTERS	743	743	685	720	500	493
EIA FIELD	36	36	20	20	20	20
78XX ECONOMIC REGULATION	2151	2172	1953	2143	524	534
ER HEADQUARTERS	760	817	678	1314	394	404
ER FIELD	1401	1355	1275	1139	130	130
8001 ADV FOR COOP WORK						
ACW FIELD	2	2	2	2	2	2
8616 GEOTHERMAL RESOURCES DEV						
GRD HEADQUARTERS	5	5	5	5	5	5
8617 ALASKA PA	38	37	39	39	39	39
8618 BONNEVILLE PA	3015	3021	3117	3154	3200	3159
8619 SOUTHEASTERN PA	36	35	39	39	39	39
8620 SOUTHWESTERN PA	157	162	169	165	174	174
8621 WESTERN AREA PA	1128	1091	1266	1220	1306	1306
WAPA POWER MARKETING	997	972	1029	995	1119	1082
WAPA COLORADO RIVER BASIN	231	219	237	220	227	224
88XX FED ENERGY REG COMM	1605	1598	1722	1560	1731	1585
FERC HEADQUARTERS	1474	1378	1591	1529	1637	1391
FERC FIELD	131	120	131	131	94	94
9XXX DEPARTMENTAL ADMIN	4988	4870	4825	4829	4777	4853
DA HEADQUARTERS	2563	2459	2447	2473	2420	2491
DA FIELD	2417	2415	2378	2355	2357	2362
TOTAL DOE APPROPRIATIONS	19827	19772	19571	19563	17650	17925

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FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

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PROPOSED APPROPRIATION LANGUAGE

OPERATION AND MAINTENANCE, ALASKA POWER ADMINISTRATION

For engineering and economic investigations to promote the development and utilization of the water, power, and related resources of Alaska, and for necessary expenses of operation and maintenance of projects in Alaska and of marketing electric power and energy, [$3,069,000] $3,538,000, of which $50,000 shall be available solely to defray emergency expenses necessary to ensure continuity of service to remain available until expended. (Energy and Water Development Appropriation Act, 1981.)

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

ALASKA POWER ADMINISTRATION

	FY 1980 Actual	FY 1981 est.	FY 1982 est.
Executive level I	—	—	—
Executive level II	—	—	—
Executive level III	—	—	—
Executive level IV	—	—	—
Executive level V	—	—	—
Subtotal	—	—	—
ES-6	—	—	—
ES-5	1	1	1
ES-4	—	—	—
ES-3	—	—	—
ES-2	—	—	—
ES-1	—	—	—
Subtotal	1	1	1
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—	—	—
GS-18	—	—	—
GS-17	—	—	—
GS-16	—	—	—
GS/GM-15	—	—	—
GS/GM-14	2	2	2
GS/GM-13	7	7	7
GS-12	6	6	6
GS-11	2	2	2
GS-10	—	—	—
GS-9	1	1	1
GS-8	—	1	1
GS-7	2	1	1
GS-6	2	2	2
GS-5	—	—	—
GS-4	—	—	—
GS-3	—	—	—
GS-2	—	—	—
Subtotal	22	22	22
Ungraded	16	16	16
Total permanent positions	39	39	39
Unfilled positions, end of year	1	—	—
Total permanent employment end of year	38	39	39

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

ALASKA POWER ADMINISTRATION
(in thousands of dollars)

	FY 1981	FY 1982
Appropriation	3,069	3,538
Proposed Supplemental	150	---
Subtotal	3,219	3,538
Unobligated Balances, Start of Year	620	---
Unobligated Balances, End of Year	---	---
Total Available For Obligation	3,839	3,538

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
ALASKA POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Alaska Power Administration - Operation and Maintenance.....	2,660	2,439	3,069	3,069	3,538	3,488
Proposed Supplementals	---	---	150	142	---	8
Total, Alaska Power Administration - Operation and Maintenance.....	2,660	2,439	3,219	3,211	3,538	3,496

PROGRAM OVERVIEW

Power Marketing - Alaska Power Administration

The goal of the Alaska Power Administration is to operate and maintain the two Federal hydroelectric projects in a manner that: ensures integrity of the projects and the Federal investment therein; maximizes reliability of service; maximizes production of energy; and minimizes costs. Market power to achieve most widespread use at lowest possible rates consistent with sound business principles and repayment requirements. Maximize public benefits from other uses of project land and water, including recreation and fish and wildlife uses. The investigations program consists of engineering, economic, and environmental studies of future water and power programs. It includes transmission and power marketing studies for hydroelectric projects under study by the Corps of Engineers. The programs are conducted in close coordination with the State, local, and other Federal entities.

Provide evaluations and studies of hydroelectric and other power supply alternatives as a basis for decisions in development of water and power resources. Assure that water and power resources receive appropriate attention in broader land and resource planning. Provide effective response to the directives concerning conservation and renewable resources. Facilitate conversion of the State's major electric power systems from their present dependency on oil and gas to hydroelectric and other relatively plentiful energy resources.

FY 1981 accomplishments include:

- Initiated program plans for Alaska Power Administration's response to President's directives on conservation and renewable resources.
- Several power market analyses underway for hydro projects under investigation by the Corps of Engineers. Strong participation in the Corps' national hydropower study.
- All normal project operation and maintenance objectives are being achieved.
- Current power repayment studies show both projects are meeting statutory repayment requirements.
- Work is underway on power market studies for the authorized Bradley Lake Project near Homer, Alaska (70 to 118 MW, and about 300,000,000 kWh/year), and the Corps of Engineers expects a construction decision in FY 1981.
- Completion of regional study of power systems alternatives for the Bristol Bay area.
- Completion of reconnaissance grade studies to identify small hydro alternatives for several small hydro projects near remote Alaskan villages.
- Studies underway on possible underwater, direct current transmission systems which would interconnect larger communities in Southeast Alaska.

Specific objectives for FY 1982:

- Market project power in accordance with authorizing legislation.
- Continue full utilization of Eklutna Project energy and peaking capability.

- Increase utilization of Snettisham Project energy from 101,000,000 kWh to 168,000,000 kWh in FY 1985.

- Perform all necessary maintenance to project facilities, including scheduling and installing necessary replacements and improvements to project facilities.

- Continue work to enhance public uses of project lands and facilities, including visitations, reservoir recreation, and cooperation with the Alaska Department of Fish and Game in the salmon production program at the Snettisham Project.

- Continue program of engineering, economic, and environmental studies of short- and long-range hydroelectric alternatives.

- Maintain inventory of hydroelectric resources.

- Provide necessary supporting studies, including evaluations of future power demands, with particular emphasis on identifying potential savings through conservation and alternative plans and costs for meeting the demands.

- Provide transmission and power market analyses of hydroelectric projects under evaluation by the Corps of Engineers.

- Continue appraisals of alternative power options, such as small hydros and wind, for small cities and villages, and identify opportunities for demonstration of these technologies.

Accomplishment of these specific objectives will result in Alaska Power Administration meeting its responsibility of the operations, maintenance, and power marketing for the two Federal hydroelectric projects in Alaska and for investigations programs in future water and power development in Alaska.

Alaska Power Administration - Operation and Maintenance
Power Marketing - Alaska Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Power Marketing - Alaska Power Administration				
Operating expenses	$1,670	$1,909	$1,975	$1,987
General Investigations ..	990	1,160	1,501	1,551
Total, Power Marketing - Alaska Power Administration	$2,660	$3,069	$3,476	$3,538

Authorization: Sec. 302, P.L. 95-91

Summary of Change

FY 1981 Appropriation enacted	$3,069
Built-in increases and decreases:	
Personnel salaries	+ 383
Administrative support items	+ 24
Communication, utilities, printing, transportation, supplies, and materials.	
FY 1982 Base	$3,476
Program Increases and Decreases	
Operation and Maintenance Emergency Fund	+ 50
Replacement Eklutna Project Office	+ 170
Energy resource program - GI	+ 50
Avalanche program - Snettisham	- 100
Carrier communication - Snettisham	- 73
Project equipment	- 35
FY 1982 Budget Request	$3,538

The Alaska Power Administration's FY 1982 budget authority request is $3,538,000, a $469,000 increase over the amount appropriated in FY 1981. The major changes are establishing an Operation and Maintenance Emergency fund, replacement of the Eklutna Project office building, completion of the Snettisham avalanche program, increases in salary costs for civil service grades and estimated wage increases for Project ungraded employees, and other inflation-related cost increases.

The Alaska Power Administration, from a budgetary viewpoint, has two major activities: the Operation and Maintenance program and the General Investigations program.

There are two Federal hydroelectric projects in Alaska. The Eklutna Project, near Anchorage, Alaska, provides a sizable amount of energy and power to utilities serving

the Anchorage and Matanuska-Susitna areas. The Snettisham Project, near Juneau, Alaska, provides the major portion of the Juneau area's electric energy requirements.

The General Investigations program is basic planning work on future water and power programs. The program involves estimating future demands for power and evaluating alternative plans for producing and transmitting the needed supplies. The work focuses on hydroelectric potentials; other renewable resources; and transmission and power market analyses; and is carried out in close cooperation with the State of Alaska, local entities, the Corps of Engineers, and other Federal entities.

The General Investigations budget request also includes the administrative expenses for the Alaska Power Administration which include the full range of administrative and management services and such overhead items as rent and utilities.

	FY 1981	FY 1982
Operating expenses	$1,909,000	$1,987,000

Program objectives are:

- Operate and maintain the hydroelectric plants and transmission systems in a manner which protects the Federal investments, maximizes energy production, and provides the highest degree of reliability at the lowest possible rate. Included in this major objective is scheduling and installing necessary replacements and improvements to project facilities.

- Market project power in accordance with authorizing legislation; continue full utilization of Eklutna Project's energy and peaking capability; increase utilization of Snettisham Project energy from 75,000,000 kWh in FY 1978 to 168,000,000 kWh in FY 1985.

- Continue to enhance public use of project lands and facilities, including visitation, reservoir recreation, and cooperation with the Alaska Department of Fish and Game in the salmon production program at the Snettisham Project.

The 30,000-kW Eklutna Project has been in operation since 1955, providing a sizable block of energy and power to utilities serving the Anchorage and Matanuska-Susitna areas. The Project has marketed, through FY 1980, over 3.5 billion kilowatt-hours of energy. The project energy output is fully utilized, and no major operating, maintenance, or marketing problems are anticipated in FY 1982.

The 47,160-kW Snettisham Project has been in commercial operation since October 1975, providing the major portion of the Juneau, Alaska area's electric energy requirements. The Project has marketed, through FY 1980, over 372 million kilowatt-hours of energy. The Project has the capability of providing approximately 40 percent more firm energy than is presently needed by the area utilities.

Annual gross power revenues from the two projects in FY 1982 are projected at $4,083,000 and $3,756,000 for FY 1981. The revenue increase is anticipated from expanded power sales from the Snettisham Project.

The budget estimate would provide funds for all normal operation, maintenance, and power marketing activities for both projects and assure capability to meet sales and revenue objectives.

Funds, in the amount of $150,000, would allow the completion of the Snettisham Project avalanche program. Design and specifications and award of contract for this program will be accomplished with FY 1981 funds.

The budget contains $170,000 to initiate the replacement of the Eklutna Project office space. A small office and work space would be constructed adjacent to the powerplant to replace the existing temporary wooden structure which is past its useful life and seriously deteriorated. Additional funds of $30,000 will be requested in FY 1983 to complete the building.

$50,000 of the FY 1982 Operating Expense budget is requested solely to defray any emergency expenses to ensure continuity of project service. The Appropriation Language provides for the funds to "remain available until expended."

The FY 1982 Operating Expense request is $78,000 over the FY 1981 enacted appropriations. The change primarily involves an estimated increase of $245,000 for the Eklutna Project Office building and the Operation and Maintenance Emergency Fund and salary increases. There is a decrease of $208,000 from the one-time items budgeted in FY 1981.

There are 23 employees in the Operating Expense program. Seven are general schedule employees, including the two Project Superintendents. There are 16 wage graded employees who operate and maintain the two Federal hydroelectric projects.

	FY 1981	FY 1982
General Investigations	$1,160,000	$1,551,000

The General Investigations program consists of: inventory, basin, and individual project studies for potential new projects; transmission system and power market evaluations for hydroelectric projects under evaluation by the Corps of Engineers; and participation in electric power aspects of comprehensive land, energy, and water resource planning. All work is coordinated closely with State, local, and other Federal entities.

Program objectives are:

- Provide evaluations and studies of hydroelectric and other power supply alternatives as a basis for decisions on development of water and power resources. Provide necessary supporting studies, such as evaluation of power demands, present and future.

- Facilitate conversion of the State's major electric power systems from their present dependency on oil and gas to hydroelectric and other relatively plentiful energy resources.

- Assure that the water and power resources receive appropriate attention in broader land and resource planning.

The budget estimate for General Investigations would provide for continuing Alaska Power Administration's program for transmission and power market studies for the Corps of Engineers hydro study program and provide preliminary assessments of small hydro and other power possibilities.

Continue to identify energy options for Alaskan villages (program initiated in FY 1981). This would include preparation of a feasibility analysis of the wind farm potential of a selected remote village in the Bristol Bay, Alaska area. This will include analyzing existing energy and power uses and implementation and developing implementation plans assessing potential reduction in use of fuel oil. $40,000 is estimated to develop this feasibility analysis.

Also, $40,000 is estimated to conduct a study of electric transport possibilities in Southeast Alaska. Many of the communities in Southeast Alaska are located near

abundant small hydro resources. A number of these projects are either under construction or in the advanced planning stages. These hydro options provide unique opportunities for all-electric economies. This, plus the limited road systems in these areas, provide good possibilities for electric transportation. The proposed study would assess the opportunities and make recommendations for demonstration of individual electric vehicles plus public transport systems.

Alaska Power Administration would develop and implement conservation and renewable resources programs for remote areas of Alaska. The programs would provide specific feasibility analysis in energy and power supply and use planning in remote small cooperatives or municipals, mostly Native. The communities are too small to afford investments needed to implement conservation and renewable resources programs. There are approximately 200 remote villages that fit in this category. It is estimated that $100,000 would be required to provide the analyses and assistance to two to three villages or communities in various areas of Alaska.

Work to date has identified a number of highly desirable targets for demonstration of new and emerging technology of specific merit for Alaskan applications. These include wind and wind farm evaluations, fuel cell applications, various types of heat pumps, and electric transport.

Another proposed FY 1982 investigation initiative involves completion of detailed feasibility studies and an EIS for our underwater, direct current transmission interconnection between the Snettisham Project and Petersburg, Wrangell, and Ketchikan. Studies underway indicate this concept should be pursued to demonstration. Estimated costs for completing the study and EIS leading to a demonstration decision are about $300,000, of which $200,000 is included in the FY 1982 General Investigations budget authority request. This would allow initial starts on design and environmental assessments.

Alaska Power Administration plans to continue support programs such as analyses of power supply and usage statistics and load forecasts, including efforts to identify potential demand reductions through conservation. Also to continue cooperation on water and power aspects of land use and other regional planning efforts.

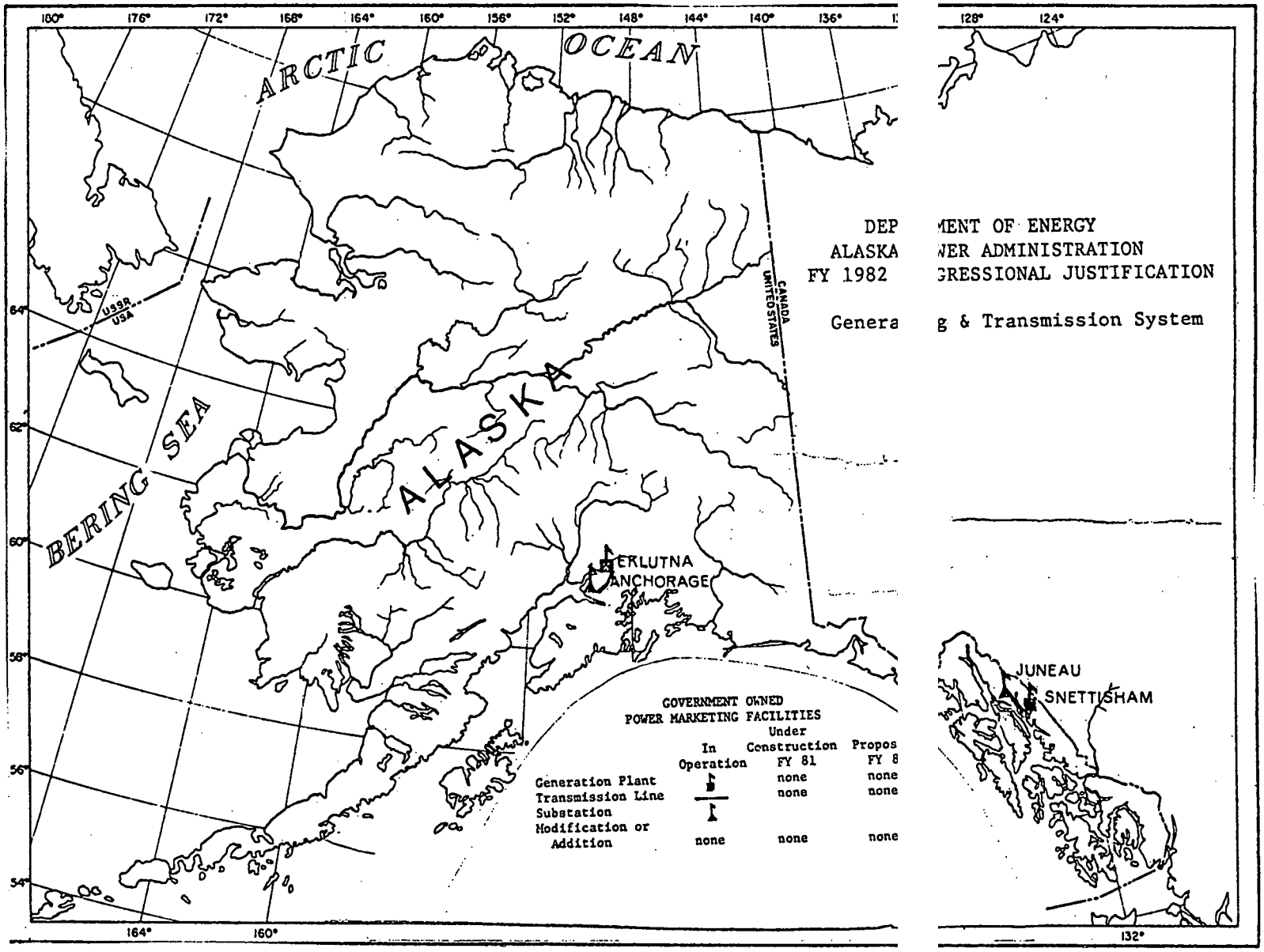
We will continue participating in Water Resources Council comprehensive studies in Alaska.

The planning program would continue as a mix of in-house and contract efforts. A limited amount of work would be accomplished in office studies of longer-term hydroelectric power options.

The General Investigations budget includes funds for the administrative support expenses of Alaska Power Administration. This includes the full range of administrative and management services.

The FY 1982 General Investigations budget authority request is $391,000 over the FY 1981 enacted appropriations. The increase is due to pay increases, inflation, investigation of renewable resource options available to rural Alaskan communities, and a study of electric transport possibilities in Southeast Alaska.

There is a staff of 16 Full Time Permanent employees in the General Investigations programs. General Investigations has had no authorized increase in personnel over many fiscal years.



DEP MENT OF ENERGY
ALASKA WER ADMINISTRATION
FY 1982 GRESSIONAL JUSTIFICATION

Genera g & Transmission System

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SYSTEMS STATISTICS
ALASKA POWER ADMINISTRATION
(In thousands of dollars)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate
Generating capacity:			
Installed capacity (kW)	77,160	77,160	77,160
Leased capacity (kW)	--	--	--
Peak capacity (kW)	77,160	77,160	77,160
Generating stations:			
Generating projects (No.)	2	2	2
Substations/switchyards (No.)	5	5	5
Substations/switchyards (kva capacity)	237,000	237,000	237,000
Available energy:			
Energy generated (megawatt-hours)	294,000	270,000	295,000
Energy purchased (megawatt-hours)	--	--	--
Energy available for marketing (megawatt-hours)	285,000	264,000	285,000
Transmission lines (circuit miles):			
115 kV	60	60	60
138 kV	42	42	42
Total circuit miles	102	102	102
DOE revenues:			
Annual gross power revenues[a/]	$ 3,595	$ 3,756	$ 4,083
Prior year adjustments	--	--	--
Total power revenues	$ 3,595	$ 3,756	$ 4,083
DOE annual gross revenues:	$ 3,595	$ 3,756	$ 4,083
Federal investment allocated to commercial power:			
Generation equipment	$ 82,381	$ 82,581	$ 82,581
Transmission facilities	29,398	29,398	29,398
Total investment	$111,779	$111,979	$111,979

a/ Includes power sales, wheeling, and other revenues.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT
Alaska Power Administration

Project	State	No. of Plants	Installed Capacity (kw)	FY 1980 Actual Power (GWH)	FY 1981 Estimated Power (GWH)	FY 1982 Estimated Power (GWH)
Power Marketed						
Eklutna	Alaska	1	30,000	194	153	153
Snettisham	Alaska	1	47,160	91	111	132
Total, power marketed		2	77,160	285	264	285
Power Wheeled And Exchanged						
Eklutna	Alaska	1		32	40	40
Total, Power Wheeled and Exchanged		1		32	40	40

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION
ALASKA POWER ADMINISTRATION

NONE

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

BONNEVILLE POWER ADMINISTRATION

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Proposed Appropriation Language

Bonneville Power Administration

Expenditures from the Bonneville Power Administration Fund, established pursuant to Public Law 93-454 [are approved for construction of Southwestern Oregon Service--Buckley-Summer Lake 500 KV transmission line and related facilities], are approved for construction of Surprise Valley Area Service in the Alturas/Cedarville, California area and for official reception and representation expenses in an amount not to exceed $1,000.

During fiscal year [1981] 1982 and within the resources and authority available, gross obligations for the principal amount of direct loans shall not exceed $2,400,000. (Energy and Water Development Appropriation Act, 1981.)

(16 U.S.C. 825s, 832: 43 U.S.C. 389,485a, 485h(c), 485i; 59 Stat. 10, 21-22; Public Law 93-454.)

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

BONNEVILLE POWER ADMINISTRATION

	FY 1981 Currently Available	FY 1981 Proposed Rescision/ Supplemental	FY 1981 Revised Estimate
Executive level I	—		—
Executive level II	—		—
Executive level III	—		—
Executive level IV	—		—
Executive level V	—		—
Subtotal	—		—
ES-6	6		6
ES-5	—		—
ES-4	—		—
ES-3	—		—
ES-2	2		2
ES-1	2		2
Subtotal	10	—	10
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—		—
GS-18	—		—
GS-17	—		—
GS-16	—		—
GS/GM-15	40		40
GS/GM-14	112		112
GS/GM-13	212	+3	215
GS-12	430	+7	437
GS-11	325	+5	330
GS-10	25		25
GS-9	151	+4	155
GS-8	56		56
GS-7	120	+5	125
GS-6	91	+7	98
GS-5	195	+3	198
GS-4	159		159
GS-3	33		33
GS-2	4		4
Subtotal	1,953	+34	1,987
Ungraded	1,120	—	1,120
Total permanent positions	3,083	+34	3,117
Unfilled positions, end of year	—		—
Total permanent employment end of year	3,083	+34	3,117

AMOUNTS AVAILABLE FOR OBLIGATION
Bonneville Power Administration
(in thousands of dollars)

	FY 1981	FY 1982
Bonneville Power Administration Fund	830,700	928,900
Total Obligations	830,700	928,900

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
BONNEVILLE POWER ADMINISTRATION
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Bonneville Power Administration.....	---	-19,144	---	16,700	136,180	-189,200

PROGRAM OVERVIEW
Bonneville Power Administration

Bonneville Power Administration (BPA) is the Federal electric power marketing agency for the Department of Energy (DOE) in the Pacific Northwest. BPA markets hydroelectric power from 21 multipurpose water resource projects of the U.S. Army Corps of Engineers and 9 projects of the U.S. Water and Power Resources Service, plus some energy from non-Federal generating projects in the region. These generating resources and BPA's transmission system of 12,794 circuit-miles of high-voltage transmission lines and 350 substations are operated as an integrated power system with operating and financial results combined and reported as the Federal Columbia River Power System (FCRPS).

BPA markets about one-half of the electric energy produced in the Northwest and provides about four-fifths of the region's electric power transmission capacity. Also, BPA markets and exchanges electric power interregionally over the Pacific Northwest-Pacific Southwest (PNW-PSW) Intertie, and in Canada over interconnections with utilities in British Columbia. During FY 1980 the FCRPS generated 81,167,730 megawatthours of hydroelectricity, equivalent to about 135,000,000 barrels of oil, if generated by oil-fired thermal powerplants.

Long Range Goals

1. Balance between demand and supply of electricity in the Pacific Northwest;

2. Safe and reliable electric energy supply systems for the Pacific Northwest and for interconnected regions;

3. Technical and economic efficiency in production, transmission, and distribution of electricity;

4. Conservation of energy and other resources.

Major Objectives and Milestones

-- Operate and maintain the BPA transmission system in accord with BPA reliability standards to provide reliable electric service to customers. By the end of FY 1980 the FCRPS had peaking capacity of more than 20,000,000 kilowatts and BPA's transmission system comprised 12,794 circuit miles of line and 350 substations; by the end of FY 1981 the BPA system will have 13,332 miles of line and 361 substations; by the end of FY 1982 the BPA system will have 13,447 miles of line and 369 substations..

-- Market Federal electric power in the Pacific Northwest to meet the region's electric energy needs and export to other regions any electric power that is surplus to the Pacific Northwest, thereby reducing the Nation's use of nonrenewable energy resources.

During FY 1980 BPA marketed 81,167,730 megawatthours of FCRPS electric energy, and purchased, wheeled, and exchanged an additional 63,272,721 megawatthours of non-Federal electric energy for a total of 144,440,451 megawatthours. In FY 1981 BPA estimates it will have available to market a total of 166,000,000 megawatthours, and 176,000,000 megawatthours in FY 1982.

-- Design and construct additions to the BPA regional transmission system to provide transmission and wheeling capacity needed to efficiently utilize the region's electric resources. During FY 1982 BPA plans to complete construction of 151 miles of line and 12 substations now under construction, continue work on 1,787 miles of line and 25 substations in progress, and begin construction of 235 miles of line and 9 substations.

-- Coordinate the Federal electric power program with the region's public and investor-owned utilities to obtain the operating economies and economical investment benefits of a single region-wide utility.

-- Administer an energy conservation program based upon public involvement and utility participation that conforms to Federal energy policy objectives and minimizes the need for new generating resources to meet the region's electric energy needs. During FY 1980, four pilot programs were initiated through BPA's publicly and cooperatively owned customers. These include residential insulation, domestic solar water heating, irrigation pump testing, and small wind energy conversion systems. These programs will be continued in FY 1981 and FY 1982.

BPA is also developing additional possible pilot program proposals. At present these are in the formulation stage, so there is no funding provision for them in this budget. Included are proposals involving do-it-yourself solar water heating, commercial building energy audits and conservation loans, heat pumps for space and water heating, passive solar home design, load management, conservation voltage reduction, and use of geothermal energy for space, water, or process heating. BPA could use the fiscal and budgetary flexibility provided by its self-financing legislation to provide funding for these proposals by adjustments in its FY 1981 and FY 1982 budgets.

-- Operate on the basis of sound business principles to provide low-cost electric energy to its customers and insure timely repayment of the Federal investment in electric power resources in the Pacific Northwest.

For FY 1981 and FY 1982 BPA will continue its operations on the basis of its self-financing authority, thus requiring no appropriations. In FY 1975 Congress granted Bonneville authority to borrow funds up to $1,250 million for construction of transmission facilities.

In compliance with a technical change that the Administration is requiring in the presentation of the FY 1982 budget, DOE is displaying for the first time its estimate of borrowing authority to be utilitized in FY 1982. This is an estimate of the usage of current borrowing authority and not a request for additional borrowing authority. This change will not affect in any manner the way in which the BPA fund or borrowing authority is administered.

FCRPS Revenues totaled $512,466,000 in FY 1980. Estimates are $697,200,000 for FY 1981, and $1,025,000,000 for FY 1982. These revenue estimates reflect increased wholesale power rates effective July 1, 1981. By the end of FY 1982 BPA's bonded indebtedness is expected to be $819,090,000. With revenues and other receipts of $1,094,000 in FY 1982 and budget outlays of $904,800 BPA will have negative net outlays of $189,200 (i.e., receipts will exceed budget outlays).

	FY 1980 Actuals	FY 1981 Estimated Obligations	FY 1982 Base	FY 1982 Program
			(in thousands of dollars)	
Bonneville Power Administration	585,014	830,700	928,900	928,900

Authorization: Public Law 93-454

Summary of Changes

FY 1981 program (obligations)	830,700
FY 1982 program (obligations)	928,900
	+ 98,200

	FY 1981 Base	Change From Base
Increases:		
Program:		
Operation and Maintenance		
System Operation	22,480	+ 610
System Maintenance	48,620	+ 1,210
Electric Power Research Institute	6,000	+ 700
Purchase Power and Wheeling		
Hanford NPR	22,000	+ 1,300
Washington Public Power Supply System - WNP #1	103,000	+ 2,600
Washington Public Power Supply System - WNP #2	110,000	+ 20,000
Washington Public Power Supply System - WNP #3	--	+ 8,100
Purchase Power	20,000	+ 38,000
Interest Expense on Borrowing		
Borrowings to finance the construction program increase, thus causing higher interest costs	44,200	+ 3,700
Associated Project Costs		
Increased operation and maintenance costs of Water and Power Resources Service FCRPS Projects	33,000	+ 12,000
Increased operation and maintenance costs of U.S. Corps of Engineers FCRPS projects	40,100	+ 6,400
Transmission System Construction		
System additions		+ 59,600
Miscellaneous Facilities		+ 52,525
Change in Undistributed Reduction	-52,525	+ 910
Reimbursable		
Energy purchase trust agreements	85,000	+ 9,000
Total Increases		+216,655

	FY 1981 Base	Change From Base
Decreases:		
Program:		
Power Management and Energy Conservation	25,800	- 1,420
Transmission System Construction		
Carry over items	266,976	-111,486
Current Year Completions	3,549	- 3,549
Reimbursable		
Other facility agreements	5,000	- 2,000
Total decreases		-118,455
Net of increases/decreases		+ 98,200

Total budget obligations for BPA's FY 1982 program will be $928,900,000. This funding level will enable BPA to perform its system operation and maintenance and transmission system construction programs in a businesslike, prudent utility manner and provide funds for purchase power and wheeling and reimbursable programs at the minimum level required by contractual agreements.

BPA's budget program for FY 1982 has been formulated in accordance with the provisions of the Federal Columbia River Transmission System Act (FCRTSA) and the Government Corporation Control Act. BPA requires no appropriations for FY 1982. To fund proposed program obligations of $928,900,000 will require outlays of $904,800,000. Revenues and other receipts for FY 1982 are estimated at $1,094,000,000. Net outlays will be -$189,200,000. Of the $928,900,000 in proposed budget obligations for FY 1982 about 66 percent is for operating costs programs, including costs of purchase power and wheeling, 23 percent is for capital outlays for transmission system construction, and about 10 is for reimbursable programs, which are funded by other entities. As of September 30, 1980, BPA had utilized $525,000,000 of its $1,250,000,000 borrowing authority. This, coupled with planned borrowings of $153,010,000 in FY 1981 and $141,080,000 in FY 1982, will bring BPA's cumulative borrowing to $819,090,000 by September 30, 1982.

On December 5, 1980, the Pacific Northwest Electric Power Planning and Conservation Act (P.L. 96-501) was enacted. The Act requires that BPA promptly prepare and propose a revised annual budget to expedite implementation of the legislation. In accordance with this mandate, BPA has submitted a revised FY 1981 budget for executive and legislative review. BPA anticipates submitting a revised FY 1982 budget as well to meet the requirements of P.L. 96-501.

Operation and Maintenance

The operation and maintenance program includes operation and maintenance of the transmission system, costs of power management activities, and participation in the research and development programs of the Electric Power Research Institute (EPRI). The operation and maintenance program for FY 1982 is projected to require $104,000,000. This is an increase of $1,100,000 over FY 1981, slightly more than 1 percent. This amount reflects increases in the operation and maintenance activities, as well as in the cost of BPA's participation in EPRI. These increases are offset by a reduction in the power management activity as a result of largely completing work in FY 1981 on the pilot energy conservation projects approved in the FY 1980 budget.

At the beginning of FY 1982, the transmission system will consist of about 13,332 circuit miles of transmission lines and 361 substations, representing an investment of $2,041,000,000. By the end of FY 1982 the transmission system will include 13,447 miles of transmission and 369 substations, representing an investment of $2,210,000,000.

Purchase Power and Wheeling

Purchase power and wheeling includes the acquisition of power from other entities through purchase and exchange, and the use of other utilities' transmission facilities. The majority of items covered in this activity will be settled through a net-billing process whereby amounts owed by BPA are offset against power sales and other services provided to BPA customers. A small number of the items will be settled by cash payments.

The costs of acquiring power from non-Federal thermal projects is the major component of this activity -- more than 80 percent in FY 1982. Total purchase power and wheeling program costs increase by $70,000,000, from $300,000,000 in FY 1981 to $370,000,000 in FY 1982. Major increases are increased costs for net-billing costs of Washington Public Power Supply System's WNP #2, initial net-billing in FY 1982 of WNP #3, and increased funding for purchase of power, if available, to meet firm power commitments of the Federal system. Other purchase power and wheeling activities are projected at apporximately the same fiscal level in FY 1982 as in FY 1981.

Interest Expense

This program covers the payment of interest to the United States Treasury on borrowings to finance BPA's construction program. Public Law 93-454 provided borrowing authority of $1,250,000,000 which is available for the construction program. The increase in FY 1982 of $3,700,000, from $44,200,000 in FY 1981 to $47,900,000 in FY 1982, reflects a higher level of borrowing which is required in FY 1982 to finance the construction program.

Associated Project Costs

This program includes repayment to the United States Treasury of the operation and maintenance costs of the USCE and WPRS power generating projects of the FCRPS; interest and amortization on the WPRS capital investment in FCRPS generating facilities; amortization on the WPRS investment in irrigation facilities allocated to the FCRPS for repayment; and coordination agreement payments to the Federal Energy Regulatory Commission. Associated project costs increase from $75,600,000 in FY 1981 to $94,000,000 in FY 1982. This $18,400,000 increase is due to increased costs of FCRPS generating projects, primarily the result of the addition of pump generators at Grand Coulee and generators at the Bonneville second powerplant.

Transmission System Construction Program

BPA's transmission system construction program provides for continued construction of facilities under construction, initiation of construction of transmission system additions, and acquisition of capital tools and equipment. Activities included for transmission system construction are preliminary engineering, reconnaissance and environmental studies, surveys, substation and transmission line design, land acquisition, material purchases, and construction.

Construction obligations for FY 1982 will require $216,000,000 or about 23 percent of BPA's total proposed program obligations for FY 1982, compared to obligation requirements of $218,000,000 for FY 1981. About 75 percent of the FY 1982 program is to continue construction of facilities programmed in prior years and underway. The remainder is for proposed system additions to be initiated in FY 1982 and tools and equipment. During FY 1982, BPA will continue construction of about 1,787 circuit-miles of transmission and 25 substations, complete and energize 151 miles of transmission and 12 substations, and begin construction of 235 miles of line and 9 substations.

There is one major transmission system addition proposed in FY 1982 which requires specific approval of Congress. This is Budget Item 718, Surprise Valley Area Service, which is required to extend and strengthen transmission in the Alturas-Cedarville area of northern California, now served by BPA by transfer over another system.

Reimbursable Programs

BPA's reimbursable programs provide for (1) the purchase of energy from other sources for BPA industrial and utility customers during periods when nonfirm energy is not

available from the Federal system, (2) construction, operation, and maintenance of transmission system facilities which are not provided by BPA under its customer service policy, (3) relocation of BPA facilities as required for highway construction and other purposes, and (4) other services provided by BPA to serve regional interests in the most cost-effective manner. BPA's reimbursable programs are funded by other entities, so there is no net effect on the Federal budget as a result of this activity.

Reimbursable programs for FY 1982 total $97 million or about 10 percent of BPA's budget obligations for FY 1982. This is an increase of $7 million from the FY 1981 funding level and is due primarily to an increase in the forecasted amount of energy purchases through trust agreements by BPA for its direct-service industrial customers.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Badger Canyon-Grandview Area Reinforcement Washington	2. Project number	B.I. 116
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost	mate: New Project
3a. Date construction starts:	2nd Quarter FY 1982	6. Total cost est	e: $19,630
4. Energization date:	1st Quarter FY 1986	Date of estima	August 19, 1980

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 700	$ 430
	To Complete	18,930	19,200

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

Construct a White Bluffs-Horn Rapids 115-kV line, with terminal facilities at White Bluffs Substation onstruct a 500/115-kV substation near Benton City, with a tap to the 500-kV Ashe-Buckley line, a 500-kV transformer, and co tions to the Grandview-Richland 115-kV line. Construct a double circuit Benton City-Badger Canyon 115-kV line, wit rminal additions at Badger Canyon. Reconductor the Grandview-Richland 115-kV line. Uprate Power System Control facilities

9. Purpose, justification of need for, and scope of project

This project will support the Grandview and Richland areas for loss of the existing Grandview-Richlan ne, serve growing loads in Richland and Benton County areas, and avoid low voltage and customer interruptions for outages dur peak load periods.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Conkelley Area Reinforcement Montana	2. Project num	B.I. 119
3. Design work initiated:	2nd Quarter FY 1982	5. Previous co	stimate: New Project
3a. Date construction starts:	1st Quarter FY 1983	6. Total cost	mate: $17,970
		Date of est	e: December 18, 1980
4. Energization date:	3rd Quarter FY 1985		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 470	$ 470
	To Complete	17,500	17,500

40

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

Construct a 62-mile Hot Springs-Columbia Falls 230-kV line, install a 170 MVA 230/115-kV transform t Elmo Substation and a 50 MVA 230/34.5-kV transformer at Kalispell Substation, and provide 230-kV terminal facilities at Hot ings, Columbia Falls, and Kalispell Substations. Construct a 1-mile double-circuit 230-kV line from Columbia Falls to the Hu Horse-Conkelley line to provide for a Columbia Falls-Conkelley line and a Columbia Falls-Hungry Horse line. Uprate Power S m Control facilities.

9. Purpose, justification of need for, and scope of project

This project is needed to serve loads in the Conkelley-Columbia Falls-Kalispell area during outage any one of the transmission lines now serving this area.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Bend Area Support Oregon	2. Project numbe	B.I. 120
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost	timate: New Project
3a. Date construction starts:	1st Quarter FY 1982	6. Total cost es	ate: $ 6,850
		Date of estin	: August 19, 1980
4. Energization date:	1st Quarter FY 1984		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 4,900	$ 1,580
	To Complete	1,950	5,270

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

Loop the Buckley-Summer Lake 500-kV line into a new 500/230-kV substation near Prineville, Oregon. I all one 650 MVA 500/230-kV transformer bank and appropriate terminal facilities. This is a joint project with Pacific Power anc ght Co. (PP&L). PP&L will construct 230-kV and 115-kV transmission facilities from the substation. Cost sharing has not yet be determined. Uprate Power System Control.

9. Purpose, justification of need for, and scope of project

This project will prevent loss of load in the Bend-Redmond-Prineville-LaPine area during transmissic ystem outages.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Grays Harbor Support Washington	2. Project num	B.I. 121
3. Design work initiated:	1st Quarter FY 1982	5. Previous co	estimate: New Project
3a. Date construction starts:	1st Quarter FY 1982	6. Total cost	imate: $ 8,220
		Date of est	e: August 19, 1980
4. Energization date:	1st Quarter FY 1985		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 1,960	$ 650
	To Complete	6,260	7,570

42

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This project will add additional support to the Grays Harbor area. Proposed facilities include reb ling the Satsop-Cosmopolis 115-kV line to a double-circuit 230-kV line, (one side will operate initially at 115-kV to maintai ne existing circuit), adding 230-kV terminal facilities at Satsop Substation, and adding a 300 MVA 230/115-kV transformer and t inal facilities at Cosmopolis Substation. Uprate Power System Control Facilities.

9. Purpose, justification of need for, and scope of project

This project will serve to relieve an overload of one Aberdeen transformer when the other is out.), loss of the PUD's Aberdeen-Cosmopolis 115-kV line overloads BPA's 115-kV Aberdeen Tap-Cosmopolis line.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	System Reactive Facilities BPA System	2. Project numb	B.I. 150
3. Design work initiated:	1st Quarter FY 1982	5. Previous cos	stimate: New Project
3a. Date construction starts:	1st Quarter FY 1983	6. Total cost e	nate: $ 2,500
4. Energization date:	4th Quarter FY 1983	Date of esti	e: August 19, 1980

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 1,500	$ 380
	To Complete	1,000	2,120

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

The FY 1982 construction program includes new installations amounting to 155,000 Kvar of system rea ve facilities. These installations will be completed by the fall of 1983.

9. Purpose, justification of need for, and scope of project

A continuing program of system reactive additions is necessary to obtain the full power output of t Government's generating plants, and to achieve the most economical operation of the transmission network. More specifically eactive installations are necessary to;

a. Raise the general voltage level of receiver-end substations;
b. Increase the power transfer capability of the system and dec se system losses; and
c. Provide voltage control under normal load variations, and un emergency conditions.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Trentwood Area Service Washington	2. Project numb	B.I. 612
3. Design work initiated:	1st Quarter FY 1982	5. Previous cos	timate: New Project
3a. Date construction starts:	1st Quarter FY 1982	6. Total cost e	ıate: $ 2,840
		Date of esti	: August 19, 1980
4. Energization date:	1st Quarter FY 1984		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 1,580	$ 410
	To Complete	1,260	2,430

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

Construct a 2.7-mile single-circuit 230-kV tap line from Trentwood Substation to the Bell-Noxon 230 line, and install a 230/115-kV 300 MVA autotransformer with one 115-kV terminal at Trentwood. Uprate Power System Contr facilitites.

9. Purpose, justification of need for, and scope of project

This project is to reduce system losses and support the loads in the Trentwood area.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Surprise Valley Area Service Oregon	2. Project number:	B.I. 718
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost es	ate: New Project
3a. Date construction starts:	1st Quarter FY 1982	6. Total cost estim	: $11,050
		Date of estimate	August 19, 1980
4. Energization date:	1st Quarter FY 1984		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 5,140	$ 4,160
	To Complete	5,910	6,890

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

Construct a 75-mile Malin-Alturas single-circuit 230-kV line. Install a 230-kV terminal at Malin Substa n, and a 230/115-kV 170 MVA autotransformer and one 115-kV terminal at Alturas Substation. Uprate Power System Control faciliti

9. Purpose, justification of need for, and scope of project

This project will strengthen transmission facilities in the Alturas-Cederville Junction area, and reduc ystem losses.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Customer Services BPA System	2. Project numbe	B.I. 770
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost	imate: New Project
3a. Date construction starts:	1st Quarter FY 1982	6. Total cost es	ıte: $ 4,570
4. Energization date:	1st Quarter FY 1984	Date of estim	December 18, 1980

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 2,750	$ 1,250
	To Complete	1,820	3,320

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This project provides for new points of delivery and addition of facilities required to meet the inc ıing loads of specific BPA customers. All customer service facilities are constructed in accordance with engineering studies ma jointly with the customers concerned to determine the most economical and best engineering plan of service.

9. Purpose, justification of need for, and scope of project

This project will provide expanded service to BPA customers, consistent with the BPA Customer Servic)licy, thereby permitting the customers to meet the expanded load requirements of their customers with adequate service and in ıased realiability.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	General Structures and Improvements BPA System	2. Project numb	B.I. 810
3. Design work initiated:	1st Quarter FY 1982	5. Previous cos	stimate: New Project
3a. Date construction starts:	3rd Quarter FY 1982	6. Total cost e	nate: $ 2,030
		Date of esti	e: August 19, 1980
4. Energization date:	4th Quarter FY 1983		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 1,870	$ 1,870
	To Complete	160	160

427

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This project provides the following: (1) new equipment maintenance buildings at Satsop and Garrison 2) security fencing at Grand Coulee maintenance building; (3) entrance improvements at Hot Springs storage and Headquarter uilding; (4) paving and drainage at Sickler Maintenance Complex; (5) energy conservation improvements at various buildings;) various appearance improvement projects for substations and line corridors; and (7) various facility renovations to im ve building and road conditions.

9. Purpose, justification of need for, and scope of project

These facilities are needed for the following reasons: (1) to solve space management problems; (2) meet OSHA safety regulations; (3) to meet EO 12003 energy conservation levels; (4) to meet other applicable laws and gulations; (5) to solve unsightly conditions that impact the environment; (6) to prevent equipment damage and obtain adequa testing data; (7) to prevent theft and vandalism; and (8) to improve maintenance work conditions.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Power System Control BPA System	2. Project numbe	B.I. 820
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost	imate: New Project
3a. Date construction starts:	2nd Quarter FY 1982	6. Total cost es	ate: $12,070
		Date of estim	August 19, 1980
4. Energization date:	1st Quarter FY 1986		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 7,600	$ 3,300
	To Complete	4,470	8,770

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This project will provide the following; (a) SCADA I equipment replacements at Dittmer, a new Dispat : Training Facility, a System Events Monitor, a System Restoration and Emergency Control Scheme, additional remotes for the renue Data Acquisition System, Digital Power Rate Relays for stability control, and upgrades to the BPA Fault Locator Syste id to substation annunciator equipment; (b) Transfer trip equipment for two 230-kV lines, "N" Microwave System improv its, "D" Microwave System antenna and waveguide replacements, upgrade of Collins RF and multiplex equipment on the "T" Microwa System, multiplex and repeater equipment for BPA's Micrwave Restoration Plan, and replacement of the DATS voice communicat system; and (c) Various control system additions, expansions, modifications, and revisions at BPA's control centers and subs ions. This project will accommodate nominal changes in power system configurations, changes in operating methods, refinement control and dispatch functions, changes initiated by other utilities in the interconnected network, and control requireme arising from unforeseen power system stability problems.

9. Purpose, justification of need for, and scope of project

This project will serve to modernize control center and substation control equipment, to provide tra ig and control facilities for emergency conditions, and to obtain needed load and billing data; to modernize line protection, rowave, and voice communication equipment, and to furnish emergency restoration equipment needs for telecommunications id to solve unforeseen stability control, dispatch, protection, and telecommunication problems uncovered throughout the BPA stem.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Tools and Equipment BPA System	2. Project number	B.I. 830
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost (	mate: New Project
3a. Date construction starts:	No Construction	6. Total cost est	e: $12,730
		Date of estima	December 18, 1980
4. Energization date:	As Required		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$12,730	$10,352
	To Complete	--	2,378

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This project includes portable power tools and shop equipment; special-purpose vehicles; automatic da rocessing equipment; office furniture; and electronic measuring instruments and measuring devices.

9. Purpose, justification of need for, and scope of project

This Budget Item provides tools and equipment to construct, operate and maintain the transmission lin substations and power system control facilities which make up the Administration's power system.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Preliminary Engineering BPA System	2. Project number	B.I. 840
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost	imate: New Project
3a. Date construction starts:	FY 1982 (various)	6. Total cost est Date of estima	te: $ 9,120 December 18, 1980
4. Energization date:	As Required		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 9,120	$ 6,105
	To Complete		3,015

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8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This Budget Item provides environmental studies, reconnaissance, preliminary surveys, designs, and Re rch and Development.

9. Purpose, justification of need for, and scope of project

This Budget Item is for the following; to comply with the National Environmental Policy Act of 1969; neet the continuing need for new technology; to permit start of construction in time to meet scheduled energization dates; and do all the above while maintaining system security and reliability.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Transformer Additions BPA System	2. Project number:	B.I. 871
3. Design work initiated:	1st Quarter FY 1982	5. Previous cost estimate:	New Project
3a. Date construction starts:	1st Quarter FY 1982	6. Total cost estimate:	$ 7,670
		Date of estimate:	August 19, 1980
4. Energization date:	3rd Quarter FY 1984		

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 6,210	$ 1,620
	To Complete	1,460	6,050

8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This Budget Item provides for the addition of transformer capacity in BPA's substations. Installation additional transformers to meet customer load growth and the replacement of existing transformers with transformers of higher acity are the principal types of B.I. 871 transformer capacity additions. The addition of cooling capacity to existing transf rs is another way to increase capacity.

9. Purpose, justification of need for, and scope of project

This Budget Item will serve to prevent overloading of existing transformers at BPA customer service s ations, with resulting damage to such transformers and loss of service to customers, by making timely transformer additions estimated peak loads approach the limits prescribed in the Customer Service Policy and the BPA Customer Service Reliabilit iteria.

FY 1982 BUDGET ESTIMATES
CONSTRUCTION PROJECT DATA SHEETS
Department of Energy
Bonneville Power Administration
Bonneville Power Administration Fund: 89-4045-0-3-271

Bonneville Power Administration
Portland, Oregon

1. Title and location of project:	Miscellaneous Capital Additions BPA System	2. Project numb	B.I. 880
3. Design work initiated:	1st Quarter FY 1982	5. Previous cos	timate: New Project
3a. Date construction starts:	1st Quarter FY 1982	6. Total cost e	ıate: $ 5,150
4. Energization date:	1st Quarter FY 1984	Date of esti	: August 19, 1980

7. Financial Schedule:	Fiscal Year	Obligations	Costs
	1982	$ 3,070	$ 1,590
	To Complete	2,080	3,560

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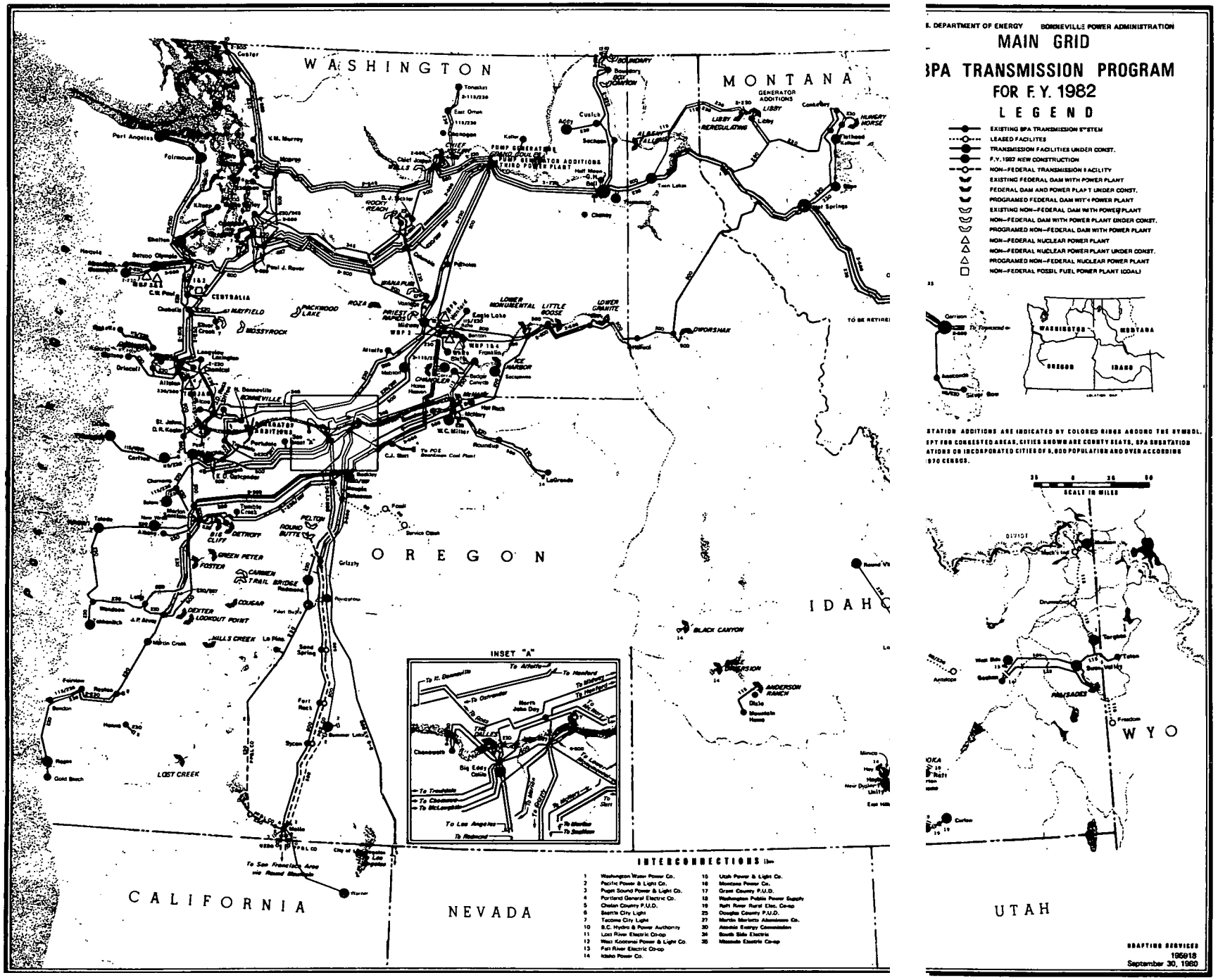
8. Brief Physical Description of Project

Work will be performed by contract and force account personnel.

This Budget Item provides for the scheduled replacement of units of property on the transmission sy ı, and for miscellaneous unforeseen capital additions or replacement.

9. Purpose, justification of need for, and scope of project

This Budget Item will provide for the design, purchase and installation of power circuit breakers, ı rs, relays, disconnect switches, batteries, poles, and other equipment items, either for replacement or additions to the s m. Also, to retire unused or obsolete equipment items and to rebuild transmission lines.



U. DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION

STATION ADDITIONS ARE INDICATED BY COLORED RINGS AROUND THE SYMBOL. EPT FOR CONGESTED AREAS, CITIES SHOWN ARE COUNTY SEATS, BPA SUBSTATION ATIONS OR INCORPORATED CITIES OF 5,000 POPULATION AND OVER ACCORDING 970 CENSUS.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET ESTIMATE

SYSTEM STATISTICS
ENERGY PURCHASED, WHEELED, AND EXCHANGED
Bonneville Power Administration
(dollars in thousands)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate
Generating capacity: USCE and WPRS Plants in Federal Columbia River Transmission System			
Number of projects	30	30	30
Installed capacity (kW)	18,626,780	18,302,480	19,384,980
Peak capacity (kW)	20,926,720	20,531,420	21,768,920
Substations:			
Number of substations	350	361	369
kVA capacity	53,047,871	56,896,771	58,713,371
Available energy: (MWh)			
Energy generated (USCE and WPRS Plants in Federal Columbia River Transmission System)	81,167,730	83,100,000	84,600,000
Energy purchased, wheeled, and exchanged (includes thermal plants)	63,272,721	82,900,000	91,400,000
Energy available	144,440,451	166,000,000	176,000,000
Transmission lines: (circuit miles)			
800 kV	265	265	265
500 kV	3,153	3,612	3,612
345 kV	709	709	709
287 kV	1,450	1,450	1,450
230 kV	3,435	3,517	3,640
138 kV	46	46	47
115 kV	3,437	3,434	3,425
Lower voltage	299	299	299
Total, circuit miles	12,794	13,332	13,447
BPA annual gross revenues:	$512,466	$697,200	$1,025,000
Plant-in-service			
BPA transmission facilities	$1,853,000	$2,041,000	$2,210,000
Power generation facilities - USCE and WPRS	3,991,000	4,406,000	5,062,000
Total	$5,844,000	$6,447,000	$7,272,000

PENDING LITIGATION
Bonneville Power Administration

National Resources Defense Council, et al. v. Hodel, et al., U.S. District Court, District of Oregon, No. 75-344, filed April 17, 1975

This litigation was initiated by several environmental groups to require BPA to prepare and file an environmental impact statement on the Hydro-Thermal Power Program in the Pacific Northwest. The District Court ordered that BPA prepare, circulate and consider an EIS on Phase 2 of the Hydro-Thermal Power Program. An injunction has been issued by the court enjoining BPA's participation in WPPSS Nuclear Project No. 4 (Richland) and No. 5 (Satsop) and the two Skagit plants being developed by Puget Sound Power and Light Co. The injunction would prohibit BPA from construction of transmission facilities taking power from these projects until the Court finds that the EIS meets the requirements of the National Environmental Policy Act. The EIS has been submitted to DOE for approval. The Ninth Circuit Court of Appeals has rendered its opinion affirming the determination of the lower court.

The Pacific Northwest Electric Power Planning and Conservation Act, which was signed by the President on December 5, 1980, authorizes BPA to assume a utility responsibility for the region and to sponsor programs for conservation and acquire renewable and conventional resources sufficient to meet the loads of public agencies, direct service industrial customers, and private utilities. Since the Act prescribes a legislative program for BPA the EIS as required by the Court no longer exists. It is BPA's intention to request the Department of Justice to file a motion to dismiss this litigation early in 1981 on the ground that it has been rendered moot by passage of the Act.

Port of Astoria, et al. v. Hodel, et al., U.S. District Court, District of Oregon, No. 75-349, filed April 22, 1975

An injunction has been issued prohibiting BPA from serving the Alumax plant at Hermiston, Oregon, until an EIS has been prepared on the power sales contract to Alumax and the relationship of that plant to Phase 2 of the Hydro-Thermal Power Program. The EIS continues in preparation. The decision was appealed and argued before the Ninth Circuit Court of Appeals. That court has required that BPA must file its EIS with the District Court when completed. BPA has made appearances before the District Court reporting on the status of the EIS. The District Court has directed that no further reports be made as long as work proceeds on the EIS.

Under the provisions of the Pacific Northwest Electric Power Planning and Conservation Act BPA will be required to offer Alumax a contract along with the other direct service industries. In view of the relationship of the EIS required by the Court in this litigation to the Hydro-Thermal Power Program consideration is being given to moving to dismiss this litigation also.

Columbia Basin Land Protection Assn., et al. v. Hodel, et al., U.S. District Court, Eastern District of Washington, No. C76-6, filed January 12, 1976

This litigation challenged the right of BPA to build the Lower Monumental-Ashe 500-kV line, the purpose of which is to bring power to be generated at nine units being installed in hydroelectric projects located along the Lower Snake River. There are basically three issues: (1) adequacy of the BPA environmental impact statement on the Lower Monumental-Ashe line, (2) whether the Bureau of Reclamation needs to obtain permission from the local irrigation district before issuing a permit to the Federal Government for a period in excess of 25 years, and (3) whether BPA must obtain a permit from the Bureau of Reclamation in accordance with the provisions of the Federal Land Policy Management Act before commencing construction of the transmission line. Issues (1) and (2) were decided adverse to the plaintiffs and (3) adverse to BPA. BPA obtained the requisite permit and filed it. The injunction was vacated and construction has proceeded. An appeal was taken to the Ninth Circuit Court of Appeals. The construction

of the Lower Monumental-Ashe Line was completed and the line energized in November 1978. A decision on the appeal is expected in the near future.

City of Portland, et al. v. Munro et al., U.S. District Court, District of Oregon, Civil Nos. 77-928 and 77-929, filed November 14, 1977

The City of Portland (the City) filed two lawsuits in the United States District Court for the District of Oregon against the Administrator of BPA and the Secretary of the Department of Energy. In the first suit the City alleges BPA has acted illegally in its sales of power to preference customers, private utilities and direct service industrial customers and that, as a result of such actions, the City has been denied an ability to purchase power from BPA. The City then requests that it be declared a preference customer; that BPA power sales agreements be set aside; that BPA adopt revised allocation procedures; and that BPA sell power to the City of Portland until such reallocation and revised rules are complete. The second suit is based upon BPA's alleged failure to comply with the terms of the National Environmental Policy Act. In this suit the City alleges that all BPA power sales contracts, extensions, renewals and the net billing agreements executed since January 1, 1970, were major Federal actions significantly affecting the quality of human environment in BPA's service area. The suit further alleges that BPA's actions have caused a serious impact on the City by reducing the quality of the environment. The City then asks that all power sales contracts, extensions, renewal agreements and net billing agreements entered into by BPA since January 1, 1970, be declared null and void; that BPA be required to prepare an environmental impact statement(EIS) on each of these agreements and that BPA be enjoined from executing any new power sales agreements or net billing agreements until BPA completes an EIS.

In July 1978 three private utilities, Pacific Power & Light Company, Portland General Electric Company, and Montana Power Company, who had previously been joined by BPA as defendants, filed cross claims against BPA. They contend that the BPA preference clause entitled them to power for their domestic and rural customers. Montana Power Company also claims a statutory geographic preference for Federal hydropower produced at Hungry Horse and Libby Dams. In action on these claims to date, the District Court, on December 27, 1978, orally granted a motion by the defendants to dismiss the claims in the first lawsuit on the ground that the City has not taken the steps necessary to render their claims ripe for court review. Subsequently, the court required further briefing on specific issues relating to the motion. Final briefs were filed on February 14, 1979, and the matter is pending. The private utilities' cross claims are also pending. On December 20, 1979, the City moved to amend its complaint for the purpose of supporting the cross claims of the private utilities and on December 27, 1979, BPA petitioned the court to deny the City's motion because the matter has already been determined. The court has taken no action on either the City's motion or BPA's petition.

In the opinion of the BPA General Counsel both lawsuits have been rendered moot by enactment of the Pacific Northwest Electric Power Planning and Conservation Act and consideration is being given to filing motions to dismiss both cases.

Northwest Environmental Defense Center, et al. v. Bonneville Power Administration, et al., U.S. District Court for the District of Oregon, Civil No. 80-366, filed March 28, 1980

The Northwest Environmental Defense Center and four individual plaintiffs filed suit in Federal District Court against BPA, the Corps of Engineers, and the U.S. Fish and Wildlife Service. They sought to stop BPA's construction of the Ashe-Slatt 500-kV double circuit transmission line crossing the Columbia River at Crow Butte Island on the western edge of the Umatilla National Wildlife Refuge. In order to identify a single Federal legal position which the U.S. Department of Justice could defend, it was necessary to reconcile interpretations by those agencies respecting the law and their authorities. In the course of this process, BPA agreed to a modification of the crossing plan under the terms of which BPA would build a temporary simple circuit 500-kV line between the island and the Washington shore and after three years place a portion of the line under a slough. This compromise formed the basis on which the Federal agencies could begin negotiations with the plaintiffs to settle the lawsuit. Construction on the

island, which was to have begun April 1, was delayed, but commenced May 8, and the temporary line has been completed and energized. In view of the agreement reached on the Settlement it is expected that this litigation will be dismissed by Stipulation of the parties at an early date.

Pacific Power & Light Company, et al. v. Duncan, et al., U.S. District Court, District of Oregon, Civil No. 80-82, filed January 22, 1980

Pacific Power & Light Company filed suit in the United States District Court for Oregon against the Department of Energy and BPA to have the Assistant Secretary-Resource Applications' interim rate order of December 3, 1979, declared unlawful and for other relief, including injunctive relief against collection of BPA's new wholesale power rates which were effective December 20, 1979. Portland General Electric Company and the Oregon Public Utility Commission have intervened as plaintiffs in the lawsuit. The Public Power Council has intervened as defendant. Plaintiffs do not contest the need for a revenue increase to BPA, but rather contest the design of BPA's rates. On September 30, 1980, the Court entered judgment for the Government and on November 26, 1980, the plaintiffs filed a Notice of Appeal to the Ninth Circuit Court of Appeals.

It is the opinion of the BPA General Counsel that the holding of the District Court will be sustained.

The Montana Power Company, et al. v. Duncan, et al., U.S. District Court, District of Montana, Civil No. 80-52M, filed June 6, 1980

The Montana Power Company and the Idaho Power Company filed suit in the United States District Court for the District of Montana seeking an injunction against collection of the interim rates approved by the Assistant Secretary in her order of December 3, 1979, and for other relief. The contentions of plaintiffs in Montana are nearly identical to those raised by plaintiffs before the District Court in Oregon. The only material difference is that plaintiffs in Montana do not concede that interim rates may be imposed based upon the imperative need for additional revenue. Plaintiffs before the Montana Court would seek to have all rates reduced to the levels prevailing before the Assistant Secretary's December 3, 1979, order. The Government filed a motion for change of venue from the U.S. District Court for the District of Montana to the U.S. District Court for the District of Oregon where the Pacific Power & Light Company case is pending. The Montana District Court granted the motion on September 9, 1980.

It is the opinion of the BPA General Counsel that in the event that this litigation proceeds further, the contentions of the plaintiff are without merit, particularly in view of the result in the Pacific Power & Light Company case.

Columbia Power Trades Council (Union) v. United States Department of Energy,Bonneville Power Administration and Sterling Munro, as Administrator, U.S. District Court, Western District of Washington, No. 79-11352, filed October 3, 1979

The Union represents several unions whose members are BPA hourly employees. Each year BPA and the Union negotiate a collective agreement covering work practices, pay, and other matters. But for the President's limitation of a wage increase to all Federal employees to 5.5 percent, BPA's hourly employees would have been entitled to an increase of 8.53 percent. The Union elected to submit entitlement to the 8.53 percent increase to nonbinding arbitration. The arbitrators' award allowed the requested increase but the BPA Administrator could not accept the award on the ground that he was bound by the President's limitation. This is an action to recover the difference between the 5.5 percent allowed and the 8.53 percent granted by the arbitration award for the period from March 4, 1979, to September 30, 1979. On August 22, 1980, a decision was issued sustaining the Government's position. A notice of appeal to the Ninth Circuit Court of Appeals was filed on September 10, 1980. If the plaintiff succeeds on its appeal, the liability of BPA for the 3.03-percent difference would be about $546,000.

Travelers Indemnity Company v. United States, U.S. District Court, District of Oregon, No. 71-287, filed April 29, 1971

The Court has issued an opinion finding BPA liable for damage to the Pacific Power & Light Company transformer at the Malin Substation. This is a subrogation claim by the utility's insurer in the amount of $1,667,545. The Government has filed a Notice of Appeal in order to protect its appeal rights. In view of the difficulty that is anticipated in obtaining a reversal, it is expected that the notice will be withdrawn.

Turco v. United States, U.S. District Court, Western District of Washington, No. C79-1110V, filed January 21, 1980

This is a wrongful death action arising from an accident between the deceased and a BPA employee. The employee, while driving his own vehicle after working hours, allegedly crossed the centerline and ran into the deceased's vehicle. The complaint alleges damages of $6,003,000.

Northwest Sandblasting, et al v. United States, U.S. District Court, District of Oregon. Nos. C80-627, 628 and 629, filed June 24, 1980

The plaintiff claims $1,121,187 damages arising from an electrical shock sustained while painting towers for BPA.

Richardson v. United States, U. S. District Court, Eastern District of Washington, No. C76-260, filed September 30, 1976

Claim for $950,000 for injuries resulting from electrical burns received by plaintiff resulting from contact of irrigation pipe with a BPA transmission line. The plaintiff has appealed a judgment in favor of the United States to the Ninth Circuit Court of Appeals.

Trapp v. United States, U. S. District Court, Western District of Washington, No. C78-280V, filed May 4, 1978

This is a companion case to Richardson v. United States in which damages of $950,000 are claimed. No trial date has been set because the parties are awaiting the appellate decision in the Richardson case.

Hinrichs v. Bonneville Power Administration, et al., U. S. District Court, Western District of Washington, No. 78-1T, filed January 3, 1978.

Action for damages in the amount of $600,600 for personal injuries sustained when plaintiff struck a guard structure erected by a BPA contractor adjacent to a State of Washington highway to facilitate stringing a transmission line across the highway. The plaintiff was driving his motorcycle at an excessive rate of speed at a curve. He joined BPA as the party having the line built, its contractor as the party erecting the structure, and the State of Washington. The United States and the State of Washington moved to be dismissed from the action. The court dismissed the State but not BPA because, in the mind of the judge, there remained a question as to the amount of control that BPA may have had over its contractor.

Coye Bryan v. United States, U.S. District Court, District of Oregon, No. C80-665, filed July 10, 1980

Complaint seeks damages for personal injuries in the amount of $500,000. The action arises out of an automobile accident between a BPA employee and the plaintiff. The issue is whether the Government employee could have avoided hitting the plaintiff's vehicle which had backed out into his path of travel. An answer has been filed, but no trial date has been set.

Maude M. Gregory v. United States, U.S. District Court, Eastern District of Washington, No. C80-188, filed May 23, 1980

Complaint seeks damages of $50,000 for personal injuries. The Government employee is alleged to have, while intoxicated, run the intersection broadsiding the plaintiff while driving her vehicle. An Answer to the Complaint was filed August 12, 1980. No trial date has been set.

United States v. Ross Equipment, Inc., et al., C80-414, U.S. District Court, District of Oregon, filed April 16, 1980

In April 1978 BPA engaged Gray's Crane & Rigging of Portland to upright a newly delivered transformer at the McNary Substation. While the transformer was being lifted the boom on the crane buckled, dropping the transformer. BPA sustained damages of $296,909.09 for repair of the transformer and temporary service. The insurance company had a metallurgical analysis made of the boom and found a defective weld in the boom. It recognized liability to BPA and paid $250,000, the maximum liability on the policy, in order to facilitate its standing to sue the vendor and manufacturer of the crane under the State of Oregon products liability statute. The litigation is being conducted by the insurer in conjunction with the United States Attorney's office in Portland. The total amount of BPA's damages is being sought and if the litigation is successful, BPA will recover the remaining $46,909.09 of its damages.

Portland General Electric Co., United States of America & Eugene Water & Electric Board v. Bechtel Corp. and Bechtel Power Corp., Civil No. 79-103, U.S. District Court, District of Oregon, filed July 10, 1980

BPA, as assignee of Eugene Water & Electric Board's (EWEB) 30% share in the Trojan nuclear electric power generating plant built by Portland General Electric Co. (PGE), is a party to this litigation to recover damages estimated to be in excess of $5,200,000. The plaintiffs alleged breach of contract and negligence on the part of the defendants in failing to design the plant in accordance with applicable laws, regulations and the final safety analysis report of the Nuclear Regulatory Commission. The damages sought include the costs of repairs to the plant in order for it to comply with applicable safety standards and costs associated with hearings on compliance with such standards of which costs BPA is liable for 30% by virtue of its assignment of EWEB's share. This litigation is now in the discovery stages. No date has been set for trial.

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DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

SOUTHEASTERN POWER ADMINISTRATION

VOLUME 5

TABLE OF CONTENTS

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Proposed Appropriation Language

Operation and Maintenance, Southeastern Power Administration

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy pursuant to the provisions of Section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southeastern power area, [$1,552,000] $7,237,000, to remain available until expended.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
SOUTHEASTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1981	FY 1982
Appropriation	1,552	7,237
Proposed Supplemental:		
Pay Cost	95	---
Subtotal, Budget Authority	1,647	7,237
Receipts and Reimbursements:		
Unobligated Balance, Start of Year	203	203
Unobligated Balance, End of Year	-203	---
Offsetting Collections from Non-Federal Sources	4,590	3,110
Total, Obligations	6,237	10,550

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

SOUTHEASTERN POWER ADMINISTRATION

	FY 1980 Actual	FY 1981 est.	FY 1982 est.
Executive level I	—	—	—
Executive level II	—	—	
Executive level III	—	—	—
Executive level IV	—	—	—
Executive level V	—	—	—
Subtotal	—	—	—
ES-6	—	—	—
ES-5	1	1	1
ES-4	—	—	—
ES-3	—	—	—
ES-2	—	—	—
ES-1	—	—	—
Subtotal	1	1	1
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—	—	—
GS-18	—	—	—
GS-17	—	—	—
GS-16	—	—	—
GS/GM-15	3	3	3
GS/GM-14	1	1	1
GS/GM-13	3	3	3
GS-12	4	4	4
GS-11	5	5	5
GS-10	—	—	—
GS-9	1	1	1
GS-8	2	2	2
GS-7	4	4	4
GS-6	6	6	6
GS-5	2	2	2
GS-4	2	3	3
GS-3	2	1	1
GS-2	1	1	1
Subtotal	36	36	36
Ungraded	2	2	2
Total permanent positions	39	39	39
Unfilled positions, end of year	3	—	—
Total permanent employment end of year	36	39	39

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
SOUTHEASTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Southeastern Power Administration - Operation and Maintenance.....	1,400	1,337	1,552	1,544	7,237	6,926
Proposed Supplementals	---	---	95	90	---	5
Total, Southeastern Power Administration - Operation and Maintenance.....	1,400	1,337	1,647	1,634	7,237	6,931

Southeastern Power Administration
Operation and Maintenance

Southeastern Power Administration's (SEPA) basic goal is to effectively market hydroelectric power produced at Federal Projects located in 10 Southeastern states in accordance with policy directives contained in Section 5 of the Flood Control Act of 1944 and in policy pronouncements issued by the Department of Energy.

Overall goals to be accomplished by SEPA in its marketing program are:

- Make Federal power available over a widespread area at the lowest possible rates to consumers consistent with sound business principles.
- Formulate power rates to recover all cost of producing and transmitting power including amortization of capital investment allocated to power over a 50-year period.
- Give preference in the sale of power to public bodies and cooperatives.
- Utilize existing area transmission facilities insofar as possible to accomplish transmission of power to customers.
- Integrate projects to the maximum feasible extent and operate projects to provide maximum power contribution in meeting area power requirements.
- Encourage development of additional hydroelectric power projects that are economically and environmentally feasible.
- Encourage customers to develop and carry out reasonable programs for conservation of energy supplies.

Accomplishments during FY 1980 and expectations for FY 1981 include:

- Power is currently marketed to 199 wholesale customers in 11 states from 21 operating projects which have a combined capacity of 2,712,375 kilowatts.
- Revenues earned in FY 1980 totaled $63,793,400. Revenues are estimated at $62,500,000 in FY 1981 and at $65,700,000 in FY 1982.
- A final written Power Marketing Policy for the Georgia-Alabama System of projects was issued early in FY 1981.
- A Proposed Power Marketing Policy for the Kerr-Philpott System of projects was issued in FY 1980 and this policy is expected to be finalized in FY 1981.
- The process for developing written Power Marketing Policy for the Cumberland Basin System and the Jim Woodruff Project will be begun during FY 1981.
- Contract negotiations are being conducted with customers located in the Georgia-Alabama System.

Specific objectives for FY 1982 to FY 1985, designed to meet the requirements of Section 5 of the Flood Control Act of 1944, are:

- Administer over 200 contracts with over 200 customers in a fair and effective manner that carries out the intent of contract provisions. This task includes power delivery, contract service, billing and collecting functions, and daily coordination of reservoir operations to maximize power output and meet firm power commitments.

- Complete formulation of written Power Marketing Policy for application to power available from the Cumberland Basin Projects and from the Jim Woodruff Project.

- Negotiate and execute appropriate and timely contract arrangements for power marketed pursuant to written power marketing policy.

- Formulate and obtain confirmation and approval of wholesale power rates for each of SEPA's systems of projects.

- Seek favorable resolution of lawsuits brought against the Department and SEPA.

- Successfully pursue proceedings before FERC involving SEPA.

- Provide technical assistance to SEPA customers in their development and implementation of energy conservation plans.

- Market power made available from the Richard B. Russell Project, now under construction, which will add 300,000 kilowatts of conventional power and is scheduled to begin generation in 1984.

In the formulation of written power marketing policy, Southeastern is moving for the first time toward the sale of all its power to preference customers. Finalization and implementation of the system marketing policies will permit preference customers to realize the full benefits of the Federal hydropower.

All costs associated with SEPA's marketing program are recovered through power revenues deposited in the Treasury.

Power Marketing
Southeastern Power Administration - Operation and Maintenance
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Operation and Maintenance				
Operating expenses	$ 1,150	$ 1,302*	$ 1,397	$ 1,315
Subtotal	1,150	1,302*	1,397	1,315
Purchase Power and Wheeling				
Operating expenses	250	250	250	5,922
Subtotal	250	250	250	5,922
Total				
Operating expenses	1,400	1,552	1,647	7,237

* Excludes a pending supplemental request of $95,000 operation and maintenance operating expenses.

Authorization: Section 5, Flood Control Act of 1944 (16 U.S.C. 825s)

Summary of Changes

FY 1981 Appropriation enacted		$ 1,552
Built in increases and decreases:		
Pay cost supplemental		+ 95
FY 1982 base		$ 1,647
Program increases and decreases:		
Operation and Maintenance		
Pay and related costs		+ 17
Travel and moving expenses		+ 13
Standard Level User Charge (Rent)		- 7
Financial Audit costs		- 115
Nominal increases in other program costs		+ 10
Subtotal		- 82
Purchase power and wheeling		+ 5,672
FY 1982 budget request		$ 7,237

A. Operation and Maintenance $1,397 $1,315

The FY 1982 budget request for this activity is $1,315,000, a net increase of $13,000 from the amount appropriated in FY 1981.

The FY 1981 appropriation provided funds for an independent audit of the Southeastern Federal Power Program which is required by Departmental policy on a biennial basis. Under current Departmental policy an audit will not be required in FY 1982, resulting in a decrease in the funding required for the activity.

The decrease is offset by increases required for the October, 1980 Payraise ($95,000) and related personnel expenses associated primarily with statutory within grade increases ($17,000), travel and moving expenses ($13,000), and nominal increases for supplies, equipment and replacements ($10,000).

Interest expressed by numerous potential customers throughout the Southeast in purchasing SEPA power and SEPA's recognition that a more formal approach to written power marketing policy development was desirable led to SEPA's decision to formulate new power policy under public participation procedures. SEPA has issued its final Power Marketing Policy for the Georgia-Alabama System of projects. Southeastern has also published its proposed policy for the Kerr-Philpott System, and public comment forums were held in November 1980. A Notice of Intent to formulate power marketing policy for the Cumberland System has been issued.

Southeastern will continue power marketing policy formulation efforts during the current and budget years.

Based upon the policy and plans developed, contracts will be negotiated for the sale of power from each of Southeastern's Systems.

Subsequent to rate reviews for the Jim Woodruff and Kerr-Philpott Projects to be accomplished in the current year, rates will be formulated and confirmation and approval sought during FY 1982.

During FY 1982 Southeastern will maintain power billing, collection and payment functions and will prepare financial and marketing analyses with respect to existing and potential projects as required. Southeastern will coordinate power operations of the 21 operating projects. Studies will continue to maximize future power operations.

No increase in personnel is proposed. Staffing requirements have been held to a constant level for a number of years although the amount of power sold and the number of customers served have substantially increased. Accomplishment of the program objectives for FY 1982 anticipates continuation of the 39 fulltime positions which constitute the current authorized manpower level of Southeastern.

B. Purchase Power and Wheeling $250 $5,922

The FY 1982 budget request for this activity is $5,922,000, an increase of $5,672,000 over the amount appropriated in FY 1981.

This activity provides for transmission service and for the purchase of firming energy under contractual arrangements with utilities in the Southeast. Southeastern does not own or operate any transmission facilities. In the absence of transmission facilities of its own, Southeastern carries out its marketing program by utilizing the existing transmission systems of the power utilities in the area. This is accomplished through "wheeling" arrangements between Southeastern and each of the area utilities with transmission lines connected to the projects under which the utility agrees to deliver specified amounts of Southeastern power to Southeastern customers and Southeastern agrees to compensate the utility for the wheeling service performed.

While the law specifies that Southeastern give preference in the sale of its power to public bodies and cooperatives, Southeastern has not been able to market all elements of its power to preference customers in the past. Power not sold to the preference customers was sold to the utilities who perform the wheeling services for Southeastern. A "net-billing" process was instituted which provided that the amounts owed the utilities by Southeastern for wheeling were offset by the amounts owed Southeastern by the utilities for purchased power with the remainder being paid by the owing party. Under this arrangement Southeastern needed appropriations to cover only those amounts where Southeastern would be the owing party after net billing.

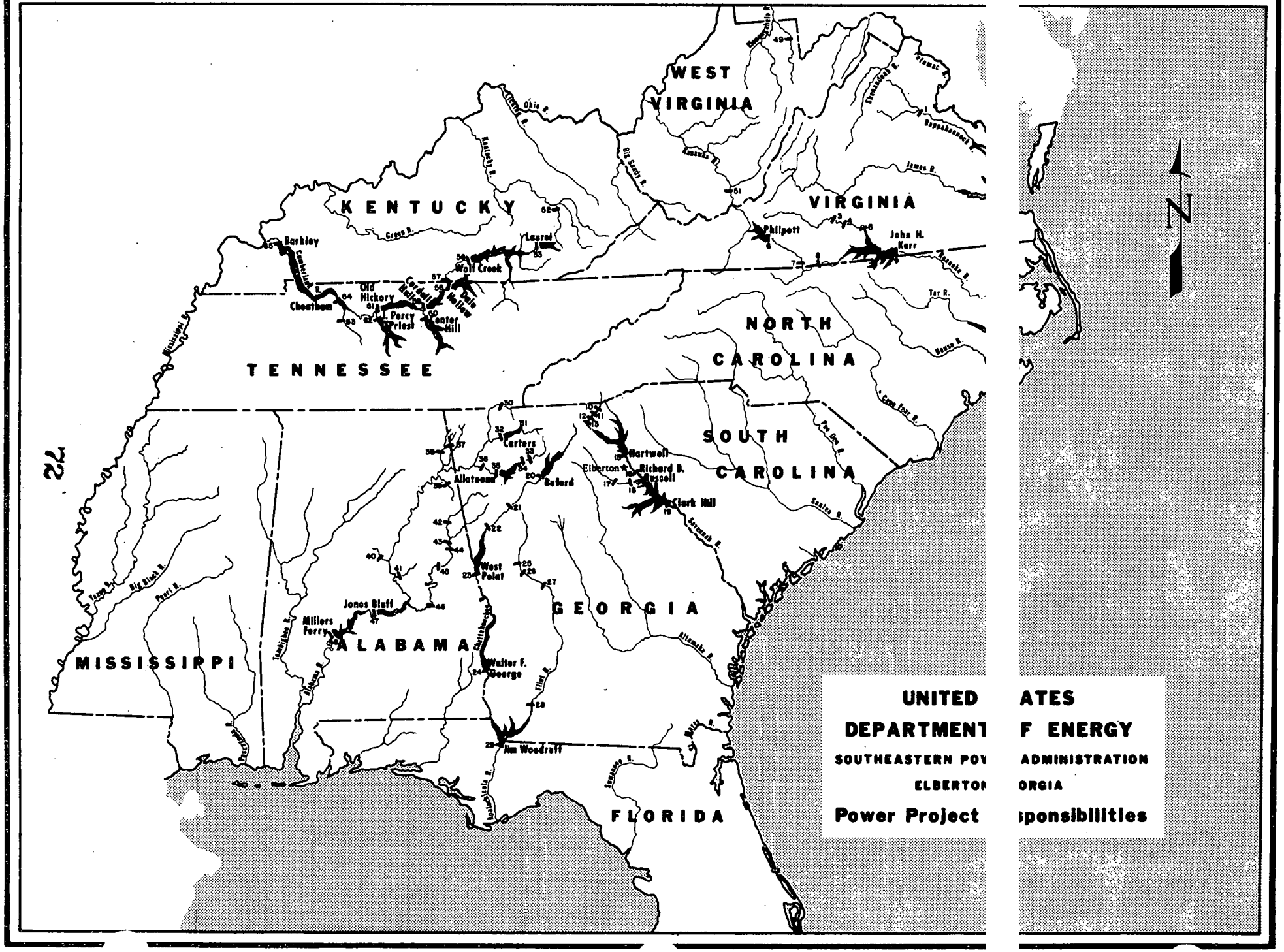
Now, however, due to preference customer load growth over time and to a shift in the power rate structures in the area, preference customers are able to fit all Southeastern's peaking power into their load curves and utilize the power both physically and economically. For these reasons, Southeastern's new written power marketing policy for its Georgia-Alabama System and its proposed policy for the Kerr-Philpott System anticipates that in the future all power will be sold to preference customers with no sales to the private utilities who now provide the transmission services. Under these conditions there will be no money owed to Southeastern by the utilities to "net-bill" against and Southeastern will need to actually pay the company the total wheeling charge each month. The FY 1982 budget because of changes in sales arrangements has requested an increase in appropriations. As new sales arrangements are negotiated for the respective utility areas, requests for appropriated funds will need to be further augmented in FY 1983, and progressively increasing each year to approximately 29 million dollars in FY 1985.

Funds provided for the purchase of power and wheeling are used only to pay amounts charged the Government under contractual arrangements for (1) delivery of power over non-Federal systems to load centers of preferred agencies for the account of the Government, and (2) purchase by the Government of energy to firm up Federally-generated power to the load factor required by preferred agencies and of support capacity required to meet commitments from the Jim Woodruff Project under certain water conditions.

It should be noted that the necessary increases in appropriated funds will be completely offset by similar increases in power revenues deposited in the Treasury by Southeastern.

The funds requested would be used to pay wheeling fees in the service areas of Duke Power Co., Kentucky Utilities Co., Virginia Electric and Power Company, Carolina Power and Light Company and Florida Power Corporation.

Funding at the level anticipated in this request will enable Southeastern to fully implement its announced power policies on a timely basis. If sufficient funds are not appropriated, implementation of new power policy will be delayed, power sales to preference customers will be reduced, and SEPA's revenue deposits to the Treasury will be reduced in an amount at least equal to the funding reduction.


WEST VIRGINIA
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SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
FLORIDA
Barkley
Cheatham
Old Hickory
Percy Priest
Center Hill
Wolf Creek
Laurel
Philpott
John H. Kerr
Carters
Allatoona
Buford
Hartwell
Richard B. Russell
Clark Hill
West Point
Walter F. George
Jones Bluff
Millers Ferry
Jim Woodruff
Elberton
UNITED
DEPARTMENT
SOUTHEASTERN POW
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DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST

SYSTEMS STATISTICS
SOUTHEASTERN POWER ADMINISTRATION
(Dollars in thousands)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate
Generating capacity:			
Installed capacity (kW)	2,712,375	2,712,375	2,712,375
Peak capacity (kW)	2,976,960	3,000,000	3,000,000
Generating stations:			
Generating projects (No.)	21	21	21
Available energy:			
Energy generated (MWh)	8,608,730	7,050,000	7,050,000
Energy purchased (MWh)	9,560	10,000	10,000
Adjustment of Energy Account (MWh)	- 339,748*	377,000	377,000
Energy available for marketing (MWh)	8,278,542	7,437,000	7,437,000
DOE revenues:			
Annual gross power revenues	$63,793	$62,500	$65,700

* Due to better than average water conditions during the last several years, energy has been added to energy accounts maintained with wheeling utilities for use in supplying future preferred customer needs.

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT

Southeastern Power Administration

Project	State	No. of Plants	Installed Capacity (kW)	FY 1980 Actual Power (kWhs)	FY 1981 Estimated Power (kWhs)	FY 1982 Estimated Power (kWhs)
Power Market						
John H. Kerr	Va.	1	204,000			
Philpott	Va.	1	14,000	763,999,028a/*	460,000,000*	460,000,000*
Allatoona	Ga.	1	74,000			
Buford	Ga.	1	86,000			
Carters	Ga.	1	500,000			
Clark Hill	Ga.-S.C.	1	280,000			
Walter F. George	Ga.-Ala.	1	130,000	3,333,314,847*	3,391,000,000*	3,391,000,000*
Hartwell	Ga.-S.C.	1	264,000			
Jones Bluff	Ala.	1	68,000			
Millers Ferry	Ala.	1	75,000			
West Point	Ga.-Ala.	1	73,375			
Jim Woodruff	Fla.	1	30,000	233,870,748	247,000,000	247,000,000
Barkley	Ky.	1	130,000			
Center Hill	Tenn.	1	135,000			
Cheatham	Tenn.	1	36,000			
Cordell Hull	Tenn.	1	100,000	3,667,630,000*	3,053,000,000*	3,053,000,000*
Dale Hollow	Tenn.	1	54,000			
Old Hickory	Tenn.	1	100,000			
J. Percy Priest	Tenn.	1	28,000			
Wolf Creek	Ky.	1	270,000			
Laurel	Ky.	1	61,000	71,588,000	67,000,000	67,000,000
Total, power marketed		21	2,712,375	8,070,402,623	7,218,000,000	7,218,000,000

* Projects are integrated hydraulically, electrically, and financially for marketing purposes.

a/Includes a one-time sale of 289,872,051 kWhs from the Energy Bank.

PENDING LITIGATION
Southeastern Power Administration

Greenwood (Miss.) Utilities Commission v. Schlesinger and Wright, U. S. District Court for Middle District of Georgia, No. 77-179-MAC; originally filed April 20, 1977, with Andrus and Fortune as Defendants in U.S.D.C., D.C., No. 77-0689; transferred by Order dated September 9, 1977.

Plaintiff, located outside the geographically selected marketing area for Federal power, filed Complaint alleging that Defendants violated Section 5 of the Flood Control Act of 1944, 16 U.S.C. 825s, or otherwise acted unlawfully in (1) denying Plaintiff an allocation of power because of its geographic location, (2) selling power to non-preference customers while denying power to Greenwood, a preference customer, (3) discriminating against Greenwood, while providing service to other preference customers, (4) failing to prepare EIS as required by Section 102 of NEPA, 42 U.S.C. 4332, (5) following unjust and unreasonable allocation procedures, (6) failing to hold a hearing and develop an adequate record upon which valid allocations could be made, (7) failing to develop and promulgate, with interested party input, regulations or procedures governing availability, application for, and allocation of power.

Following extensive discovery, Plaintiff filed a motion to add as parties the Southern Company and four of its subsidiaries, entities with whom SEPA has marketing arrangements, and add an antitrust count to the complaint. The motion was denied on November 5, 1979. Subsequently, on August 15, 1980, Defendants filed a motion for partial summary judgment seeking to narrow the issues which must be tried. Following a ruling on Defendants' pending motion, the pretrial briefing and trial schedule will be re-established.

Southeastern Power Administration v. Kentucky Utilities Company, before the Federal Energy Regulatory Commission, Docket No. EL80-7

Because SEPA was unable to obtain a reasonable contract with Kentucky Utilities Company for wheeling 25 megawatts of Cumberland River Basin power to eight Kentucky municipalities, after five years of negotiations, SEPA filed, on December 11, 1979, an application to FERC requesting pursuant to Sections 211 and 212 of the Federal Power Act that Kentucky Utilities Company be ordered to perform the wheeling service for SEPA on fair and reasonable terms. Six of the eight cities petitioned and were allowed to intervene. Following the denial of a motion by KU to dismiss, the proceeding was organized and is proceeding according to the following schedule: data requests answered July 21, 1980; SEPA direct testimony filed September 15, 1980; municipal direct testimony filed October 6, 1980; KU direct testimony filed December 8, 1980; FERC Staff direct testimony by January 12, 1981; all rebuttal testimony by February 9, 1981; prehearing briefs by March 9, 1981; trial to commence March 23, 1981.

Power Marketing
Southeastern Power Administration - Continuing Fund
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Continuing Fund Emergency Expenses ...	...	...	...	...
Total	...	...	...	...

Authorization: 16 U.S.C. 825s

The Southeastern Power Administration Continuing Fund of $50,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southeastern area, is available to defray emergency expenses necessary to insure continuity of service.

DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

SOUTHWESTERN POWER ADMINISTRATION

VOLUME 5

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Proposed Appropriation Language

OPERATION AND MAINTENANCE, SOUTHWESTERN POWER ADMINISTRATION

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy, and for construction and acquisition of transmission lines, substations and appurtenant facilities, and for administrative expenses connected therewith, in carrying out the provisions of section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southwestern power area, [$28,208,000] <u>including purchase of not to exceed one passenger motor vehicle for replacement only, $21,269,000</u> to remain available until expended.

Note: During FY 1981 Southwestern elected not to replace one of the four passenger vehicles because of low mileage. The above language will allow a replacement in FY 1982.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

Southwestern Power Administration
(in thousands of dollars)

	FY 1981	FY 1982
Appropriation	28,208	21,269
Proposed Supplementals:		
Pay cost	320	---
Subtotal	28,528	21,269
Unobligated Balances, Start of Year	32,309	27,605
Unobligated Balances, End of Year	-27,605	---
Total Available For Obligation	33,232	48,788

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

SOUTHWESTERN POWER ADMINISTRATION

	FY 1980 Actual	FY 1981 est.	FY 1982 est.
Executive level I	—	—	—
Executive level II	—	—	—
Executive level III	—	—	—
Executive level IV	—	—	—
Executive level V	—	—	—
Subtotal	—	—	—
ES-6	—	—	—
ES-5	1	1	1
ES-4	—	—	—
ES-3	—	—	—
ES-2	—	—	—
ES-1	1	1	1
Subtotal	2	2	2
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—	—	—
GS-18	—	—	—
GS-17	—	—	—
GS-16	—	—	—
GS/GM-15	4	4	4
GS/GM-14	6	6	6
GS/GM-13	15	15	16
GS-12	15	15	18
GS-11	12	12	12
GS-10	8	8	8
GS-9	9	9	9
GS-8	3	3	3
GS-7	4	4	5
GS-6	13	12	12
GS-5	6	6	6
GS-4	12	12	12
GS-3	5	5	5
GS-2	—	—	—
Subtotal	112	111	116
Ungraded	56	56	56
Total permanent positions	170	169	174
Unfilled positions, end of year	13	—	—
Total permanent employment end of year	157	169	174

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
SOUTHWESTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Southwestern Power Administration - Operation and Maintenance.....	32,180	16,223	28,208	37,208	21,269	29,269
Proposed Supplementals	---	---	320	304	---	16
Total, Southwestern Power Administration - Operation and Maintenance.....	32,180	16,223	28,528	37,512	21,269	29,285

PROGRAM OVERVIEW

Southwestern Power Administration - Operation and Maintenance

The Southwestern Power Administration (Southwestern) is the marketing agent for the disposal of power and energy generated at U.S. Army Corps of Engineers' hydroelectric plants in the six-state area of Kansas, Oklahoma, Texas, Missouri, Arkansas, and Louisiana. It is headquartered in Tulsa, Oklahoma, with an operation control center located in Springfield, Missouri, and maintenance crews and support warehouses located in Muskogee and Ada, Oklahoma; Jonesboro, Arkansas; and Springfield, Missouri.

Southwestern provides transmission lines, substations, switching stations, and communication facilities for integration and optimal use of diversity between hydroelectric projects and the transmission and sale of power to geographically dispersed customers.

Southwestern schedules and controls the generation of power from 22 hydroelectric projects (+1 in '82) to 76 contracts from 60 system interconnection points with publicly and privately-owned utilities. In addition, Southwestern operates and maintains 1,680 miles of transmission lines consisting of 161, 138, and 69 kV wood pole and steel construction. It performs maintenance on 20 radio and microwave stations, 12 switching and 20 substations, with a total substation capacity of 1,083,434 KVA.

Estimated gross power sales revenues for FY 1982 are $70,800,000 compared with $70,100,000 estimated for FY 1981.

Department of Energy

Southwestern Power Administration
Operation and Maintenance
(Tabular dollars in thousands)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Power marketing:				
Operating expenses	$ 5,884	$ 7,315	$ 7,315	$ 8,521
Purchase power & wheeling	19,300	10,300	10,300	9,210
Construction	6,996	10,913	10,913	3,538
Total, power marketing	$32,180	$28,528	$28,528	$21,269

Authorization: 94 Stat. 1331 FY 1981 Appropriation Act P.L. 96-367 Oct. 1, 1980.

Summary of Changes

FY 1981 Appropriation enacted		$28,208
Built-in increase:		
Pay Cost Supplemental (GS Pay Oct. 80)		320
FY 1982 Base		$28,528
Program Increases and Decreases		
Operation and Maintenance:		
Annual wage-board negotiated pay increase	+150	
Financial Certified Public Accounting Contract	-250	
GSA Standard Level User Charge Space Rental	+70	
Operating Cost increases - commun., util., sup., matls.	+89	
Five Additional Positions	+100	
Contracting of Transmission Line Maintenance	+900	
Pay Cost Supplemental for GS Employees (FY 1981 only)	-320	
Pay Cost for GS Employees (FY 1982)	+467	
Purchase Power & Wheeling:		
Expected Carryover Funds FY 1980 & 1981	-1090	
Construction:		
Reduction of Harry S Truman Activity	-7940	
Minor Project Additions	+565	
FY 1982 Budget Request		$21,269

SOUTHWESTERN POWER ADMINISTRATION
Operating Expense Activity

	1981	1982
Operating Expense	$7,315,000	$8,521,000

The Operating Expense activity is made up of the following functions.

1. System Operation ($874,000) - consists of functions performed in the day-to-day operation of the SWPA power system in marketing power and energy in a six-State area. During fiscal year 1982 SWPA will schedule and dispatch power from 22 Federal hydroelectric plants with a total installed capacity of 2,076,700 kilowatts, utilizing 1,680 miles of high voltage transmission system and 32 switching and substations. One additional hydroelectric plant will be added to the system in FY 1982.

The Springfield, Missouri, Control Center, together with the operations office at Tulsa, Oklahoma, dispatch power and energy to meet the load requirements of wholesale power customers. These centers are responsible for monitoring, controlling and recording the delivery of power and energy that flows over 63 interconnections which have been established between the SWPA transmission system and other utility systems.

Power resources and marketing analysis is performed which includes the planning of an interconnection plan for the efficient use of hydroelectric resources and the power system facilities under SWPA jurisdiction. Economic analyses are made on the repayment potential of proposed hydroelectric sites and market conditions. Power capability studies based on existing and future hydroelectric projects, load studies, feasibility studies affecting the transmission system; the evaluation of program alternatives and regional power system interconnection studies enter into such planning.

2. System Maintenance ($5,235,000) - consists of functions performed in the maintenance of 1,680 miles of high voltage transmission lines, 32 sub and switching stations, 20 radio and microwave stations, and supervisory control and communication equipment for control of the entire SWPA system and integrated projects, including 22 Corps of Engineers' hydroelectric projects.

SWPA's maintenance activity is carried out by personnel stationed in four area locations--Jonesboro, Arkansas; Springfield, Missouri; Muskogee and Ada, Oklahoma--with each area responsible for the safe and continued operation of approximately 400 miles of transmission lines and 8 substations. The maintenance activity is steadily increasing to accommodate the complexity of the electrical system and the increased maintenance requirements associated with an aging system. Each of the four areas average changing out 100 transmission line poles, 50 crossarms and related braces, guys, etc., along with numerous items of power equipment in sub and switching stations each year, as most of the transmission facilities were installed in the early 1950's and 1960's and are now reaching their expected life and must be replaced.

In addition to the transmission line, substation and control system maintenance, each area maintains a brush control program on SWPA's transmission rights-of-way with each line being recleared on a three-year cycle due to the extended growing season in the Southwest. The maintenance of the transmission line rights-of-way also includes fence gates, access roads, and the protection and preservations of the environment in accordance with the National Environmental Policy Act (P.L. 91-190).

Program support functions necessary for direct maintenance of the SWPA program are included in this amount.

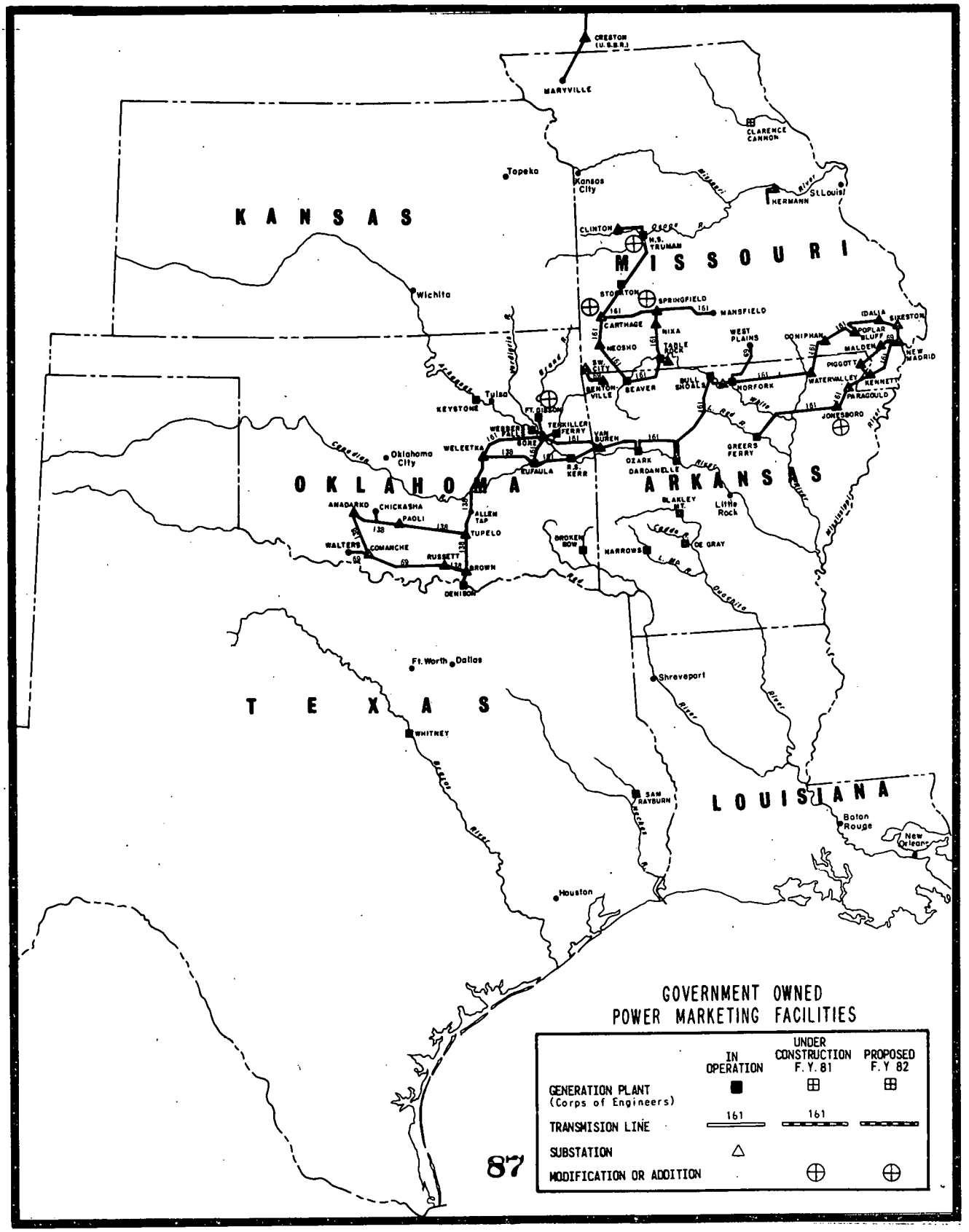
3. Power management ($687,000) - consists of functions involving power contracts and related activities. The Division of Power Marketing, through the Branch of Rates and Repayment, organizes, plans and directs the financial soundness aspect of power sales, maintains marketing statistics and prepares rate and repayment studies, and through the Branch of Customer Service is responsible for the negotiation and administration of contracts for the sale, purchase, and interchange of power and energy with cooperatives, municipalities, Government agencies and private utility companies. Contact is maintained with SWPA customers to promote coordinated power planning for best utilization of hydro peaking power and to enhance reliability of service. Comparisons are made of customer load growth to resources available for sale. Revenue estimates are compared with the financial repayment requirements of Federal investment in transmission and hydrogeneration plants. Marketing reports are also maintained on each customer and each classification of electric service for analysis by management.

During fiscal year 1982 additional capacity is expected to be placed in commercial operation from one project nearing completion. Considerable negotiation is required to assure that this power is utilized to the best advantage and to assure recovery of the Government's costs and investments. Also this process is complicated by the timetable (1980 - 1985) in which the various generating units are scheduled to come on line due to varied interests not within the control of SWPA, all of which will cause contracts to be prepared to accommodate maximum flexibility.

The number of power contracts under negotiation is increasing significantly as firm power contracts and high load factor peaking power contracts expire and lower load factor peaking power sales arrangements are developed in order to market capacity in a manner which will optimize net revenue. Moreover, with the advent of public allocation hearings and our responsibilities in keeping with the Flood Control Act of 1944 to seek the most widespread use of Federally generated power, it is expected the number of power contracts for negotiation will increase even more significantly.

4. General management ($1,725,000) - consists of functions that provide general management and direction of SWPA's programs. These functions include the Office of the Administrator, Equal Employment Opportunity, Personnel recruitment and placement, Legal support and the financial functions of Budgeting and Accounting and general office support.

DEPARTMENT OF ENERGY
SOUTHWESTERN POWER ADMINISTRATION
TRANSMISSION SYSTEM



Southwestern Power Administration
SYSTEMS STATISTICS
(Dollars in thousands)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate
Generating capacity:			
Installed capacity (kW)	1,929,800	1,929,800	2,147,800
Peak capacity (kW)	1,991,000	1,892,500	2,097,700
Generating stations:			
Generating projects (No.)	21	21	23
Substations/switchyards (No.)	32	32	32
Substations/switchyards (kva capacity)	1,189,999	1,189,999	1,189,999
Available energy:			
Energy generated (megawatt-hours)	3,993,415	5,221,300	5,591,200
Energy purchased (megawatt-hours)	465,284	461,200	537,400
Energy available for marketing (megawatt hours)	4,497,534	5,242,200	5,556,000
Transmission lines (circuit miles):			
161 kv	1,083	1,083	1,083
138 kv	348	348	348
69 kv	234	234	234
Total circuit miles	1,665	1,665	1,665
DOE revenues:			
Adjusted gross power revenues a/	61,296	70,100	70,800
Prior year adjustment	-	-	-
Total revenues	61,296	70,100	70,800
Federal investment allocated to commercial power:			
Generation equipment	618,400	621,600	803,700
Transmission facilities	67,100	67,100	67,100
Total investment	685,500	688,700	870,800

a/ Includes power sales, wheeling and other revenues.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

Southwestern Power Administration
POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT

Project	State	No. of Plants	Installed Capacity (kW)	FY 1980 Actual Power (GWH)	FY 1981 1/ Estimated Power (GWH)	FY 1982 Estimated Power (GWH)
Power Marketed						
(Interconnected System)	Missouri	4	463,200	1,335	1,734	1,896
	Arkansas	8	995,500	1,634	1,645	1,705
21 Projects	Oklahoma	7 ½ 2/	546,600	819	998	1,064
	Texas	1 ½ 2/	65,000	303	391	407
30% Tex-La Sys.	Louisiana	0	0	65	152	159
	Kansas	0	0	71	67	70
	WAPA 3/	0	0	97	0	0
Subtotals		21	2,070,300	4,324	4,987	5,301
Isolated						
Narrows Project	Arkansas	1	25,500	0	0	0
30% to LA; 70% to TX						
Sam Rayburn Project	Texas	1	52,000	92	78	78
50% to EX; 50% to LA	Louisiana	0	0	82	66	66
Subtotals		2	77,500	174	144	144
Total, power marketed		23	2,147,800 4/	4,498	5,131	5,445
Power Exchanged						
Total, power exchanged				100	111	111
Power Wheeled (megawatts)				126	238	239

1/ Represented power delivered to customer in designated state.
2/ 1 Unit of 2 Units Denison Project to Texas; 1 Unit of 2 Units Denision Project to Oklahoma.
3/ For disposition to the Western Area Power Administration in the Missouri River Basin.
4/ Includes 160,000 KW Harry S Truman Project and 58,000 KW Clarence Cannon Project to be completed in FY 1982, both located in Missouri.

SOUTHWESTERN POWER ADMINISTRATION
Purchase Power and Wheeling Activity

Purchase of Power and Wheeling - Obligations to be incurred during FY 1982 for this activity are based upon estimated amounts of thermal energy required to supplement hydro energy in order to meet specific contractual commitments and to pay transmission wheeling expenses for moving power to Government customers not directly connected to the SWPA transmission system (see "A" below). In addition, quantities of thermal energy must be purchased to supplement hydro generation during low water years (see "B" below). If in any month the cost of energy purchased by SWPA from a particular customer, plus any transmission service changes due that customer, exceed the revenue received from that customer, an obligation from this activity is incurred.

The amount of funds requested, plus an expected carryover from FY 1981 of $8,000,000, is estimated to meet expected contractual commitments and purchase thermal energy for four months of critical year water conditions. Should critical inflow conditions continue for a full 12 month period, total funding in the amount of $45,700,000 may be needed to meet contractual commitments.

A. Contract Commitments		Budget Authority
Oklahoma Companies	Wheeling	$ 2,622,500
	Energy	4,896,100
Western Area Power Administration		106,000
Subtotal		$ 7,624,600
B. Thermal Support for Hydro System		
Western Area Power Administration		$ 300,000
Other Utility Systems		9,285,400
Subtotal		9,585,400
Total - Purchase of Power and Wheeling		$17,210,000
FY 1981 Carryover		-8,000,000
FY 1982 Budget Authority		$ 9,210,000

SOUTHWESTERN POWER ADMINISTRATION

FEDERAL PEAK GENERATION CAPACITY COMPLETED OR UNDER CONSTRUCTION IN FISCAL YEAR 1982
(Thousands of Kilowatts)

Federal Projects	Total in Service 10/1/80	1981	1982	1983	Total
Completed	1,930	-	-	-	1,930
Under Construction					
Harry S Truman	-	-	160 1/	-	160
Clarence Cannon	-	-	58	-	58
Total	1,930	0	218	0	2,148
Cumulative Total	1,930	1,930	2,148	2,148	2,148

1/ The availability of dependable capacity of more than 53 MW (two units) before 1983 is questionable at this time.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

Southwestern Power Administration
PENDING LITIGATION

Arkansas Power & Light Company and Reynolds Metals Company v. James R. Schlesinger, Secretary of Energy, et al., No. 79-1263 (D.D.C.; filed May 8, 1979) seek declaratory and injunctive relief from a rate increase, Rate Order No. SWPA-1 claiming that this increase is in violation of their contract with Southwestern Power Administration. Plaintiff's First Request for Production of Documents was filed on July 2, 1979. Plaintiff's First Set of Interrogatories was filed on July 31, 1979. Defendant's Answer was filed on July 9, 1979. A Motion for Summary Judgment was filed by the United States on May 21, 1980. A hearing on said Motion was held on August 26, 1980. As of September 30, 1980, no ruling has been issued.

Associated Electric Cooperative, Inc. v. Cecil Andrus, et al., No. 2410-70 (D.D.C.; filed August 12, 1970) seeks declaratory and injunctive relief from the application of an annual $2.6 million rate schedule transmission charge for service furnished plaintiff under contract. At present, negotiations are being conducted by the parties in an effort to reach a mutually acceptable settlement of this lawsuit as mandated by Public Law 95-456 approved October 13, 1978. Status Reports of these negotiations are being furnished to the court.

City of Fulton, City of Lamar, City of Thayer, City of Piggott v. United States of America, No. 509-80 C. A Complaint was filed in the United States Court of Claims on September 18, 1980, by four municipalities who are preference customers of Southwestern Power Administration. In this litigation the plaintiffs challenge the interim rate authority as well as the quantities of power delivered under their contracts.

United States v. Tex-La Electric Cooperative, Inc., No. 80-2813, Section K 4 (3), (E.D.LA.; filed on July 29, 1980). This lawsuit was filed to collect money due and owing from the defendant. The defendant maintains there is no legal foundation for the establishment of rates on an interim basis. A preliminary pre-trial hearing was held on October 21, 1980. A Motion for Summary Judgment is to be filed the middle of December.

United States v. Sam Rayburn Dam Electric Cooperative, Inc., No. H-80-1781 (S.D.TX.; filed on August 7, 1980). This is a companion case to the Tex-La case discussed above. The issues are the same in both cases.

LEGEND

Project Expenditures Period | Project Component Expenditures

FISCAL YEAR

LINE NO.	PROGRAM ITEM	RATING	LENGTH	AWARD DATE	ESTIMATED TOTAL	TOTAL TO SEPT. 30	1980	1981	1982	1983	BALANCE TO COMPLETE	ESTIMATED COMPLETION	LINE NO.
	1	2	3	4	5	6	7	8	9	10	11	12	
1	CAPITAL EQUIPMENT NOT RELATED TO CONSTRUCTION			**	1720.0	*	769.0	840.0	880.0				1
2													2
3	SYSTEM METERING, RELAYING & COMMUNICATIONS				585.0	*	77.0	275.0	310.0				3
4	PROTECTIVE RELAYING, METERING & TELEMETERING IMPROVEMENTS			**	195.0	*							4
5	COMMUNICATION & CONTROL SYSTEM IMPROVEMENTS			**	390.0	*							5
6													6
7	MINOR MODIFICATIONS				1133.0	*	160.0	315.0	818.0				7
8	OCB REPLACEMENTS			12/79,12/80	234.0	*	AWARD	AWARD					8
9	LINE SECTIONALIZING			2/80	711.0	*	AWARD						9
10	MISCELLANEOUS MODIFICATIONS			**	188.0								10
11													11
12	HARRY S TRUMAN INTERCONNECTION PROJECT				10,000.0		34.0	8,970.0	1,030.0				12
13	HARRY S TRUMAN DAM TO CLINTON SUBSTATION LINE	161 KV	30 MILES	COMPLETED	10,000.0								13
14	CLINTON SUBSTATION ADDITION	161 KV		COMPLETED									14
15	HARRY S TRUMAN DAM TO CARTHAGE SUBSTATION LINE	161 KV	112 MILES	4/82	9750.0		EIS	LAND		LD			15
16	CARTHAGE SUBSTATION ADDITION	161 KV		12/80,8/81	250.0		AWARD		AWARD				16
17													17
18	REGIONAL INTERCONNECTION STUDIES				1,000.0			500.0	500.0				18
19	ENGINEERING & CONTRACT ADMINISTRATION			12/80	200.0			AWARD					19
20	CONTRACTS			6/81,6/82	800.0				AWARD	AWARD			20
21													21
22													22
23							1,040.0	10,900.0	3538.0				23

NOTES:

* CONTINUING AREA WIDE PROGRAM

** INVOLVES NUMEROUS ITEMS TO BE SCHEDULED AS NEEDS REQUIRE

DEPARTMENT OF THE INTERIOR
SOUTHWESTERN POWER ADMINISTRATION
CONTROL SCHEDULE
FISCAL YEAR 1982

SOUTHWESTERN POWER ADMINISTRATION
CONSTRUCTION ACTIVITY

Construction Projects & Capital Acquisition . . . . . $ 3,538,000

	TEC	Cumulative Prior Year Obligations	FY 1981 Estimate BA	FY 1 Esti B	Cumulative Future Year BA
1. Harry S Truman Interconnection Project, Western Missouri	$17,223	$3,568	$8970	$10	0

These funds are the estimated amounts required in FY 1982 to continue construction of ap imately 112 miles of 161 kV transmission line and provide terminal facilities at Carthage Substation. The Ha S Truman to Carthage Line Section will be connected to the Stockton Dam, if required to integrate this projec th Southwestern Power Administration (Southwestern) transmission grid. The agreement with Empire District Ele c Company whereby the Stockton project is interconnected with the Southwestern system through transmission lin f Empire and Associated Electric Cooperative terminates in 1983. If a satisfactory agreement with these parties continue the present arrangement is not made, it will be necessary to interconnect Stockton to the Southweste rid by constructing Federal transmission lines.

The Harry S Truman project is expected to provide 160,000 KW of hydro peaking capacity u ; a pumpback type operation requiring off-peak pumping energy. The funds requested herein are required to plete construction of the interconnection facilities.

	TEC	Cumulative Prior Year Obligations	FY 1981 Estimate BA	FY Est e	Cumulative Future Year BA
2. System metering, relaying, and communications and engineering	Continuing	$-0	$275	$3	$295

Upgrade Communication System ($100,000) - The Southwestern communications system is compos of many separate links of different modes. Many of these are old and becoming obsolete. A study has been initiatec establish a long-range communication plan for the entire Southwestern system. These funds will provide for the s y costs and initial implementation of the approved plan.

Load Control Changes in Oklahoma ($50,000) - To better allocate the line losses between pa cipating companies in Oklahoma, the load control areas are being modified. Southwestern is to pay its proportic e share as reached in an agreement with Oklahoma Gas and Electric Company and the Western Farmers Cooperative.

Generation and Transmission in Southeast Missouri and Northeast Arkansas ($160,000) - The ds will also provide for the purchase and installation of Southwestern-owned telecommunication channels betwee e Springfield, Missouri, Power Dispatching and Operation Center, and the Federal generation and transmission syste southeast Missouri and northeast Arkansas. This area is now served by an unreliable and obsolete telecommunicati system. A reliable system is necessary since several customers rely on the system for their total power suppl

	TEC	Cumulative Prior Year Obligations	FY 1981 Estimate BA	FY 198 Estimat BA	Cumulative Future Year BA
3. Minor Modifications-Various Locations	Continuing	$-0		$818	Continuing

Replace Undersized Busses at Substations ($300,000) - The busses at Southwestern's Springf d, Carthage, and New Madrid Substations were installed a number of years ago. Continued load growth plus addit al interconnections have resulted in these busses reaching their maximum ampacity. Serious damage to equipmer resently in the stations could result if adequate size busses are not installed.

Install Sectionalizing in the Ft. Gibson to Gore 161 kV Line ($75,000) - This line has a t from it to OG&E generating plant at Muskogee. Installing sectionalizing switches will eliminate de-energizing th ntire line when emergency conditions or periodic maintenance is required.

Minor Modifications-Various Locations ($433,000) - Minor equipment and structure additions modifications are periodically required to correct a deficient or changed condition. New facilities by othe such as highways and etc. often require minor changes in Southwestern's facilities, sometimes on a reimbursable sis, but requiring initial expenditure of appropriate funds. The amount herein will allow Southwestern to re nd in a timely manner to these developments.

	TEC	Cumulative Prior Year Obligations	FY 1981 Estimate BA	FY 1982 Estimate BA	Cumulative Future Year BA
4. Regional Interconnection Studies System Wide	$1,000	$-0	$500	$500	$-0

This project will fund Southwestern's participation in regional interconnection studies to d :mine the costs and potential benefits of EHV transmission interconnections between Federal power marketing syst , including initial surveying and right-of-way acquisition.

Capital Acquisition:

Capital equipment not related to construction . . . . . .$ 880

The funds requested will be used to replace automotive vehicles, other than passenger carrying, a eavy equipment, which are utilized in the maintenance and operation of transmission lines, microwave stations, an bstations. Funds are included for the purchase of construction materials and equipment used in maintaining t transmission system. Minor modifications not covered elsewhere and necessary replacements are to be provided n these funds.

Allocation of Funds:

(1) Line Materials . . . . . $ 258

SWPA's transmission lines will average over twenty-three years of age in FY 1982 and will be quiring increased maintenance and replacements in comparison to previous years. In addition, the lo range trend indicates additional increases in the cost of wood products which account for a major portio f materials purchased for line maintenance. The $258,000 requested herein is necessary to purchase the erial required to maintain the SWPA transmission lines in accordance with accepted industry standa and practice.

(2) Substation Materials . . . . . .$ 159

$95,000 of the above is requested to purchase a replacement 161 kV OCB. The present OCB is fficient in size to interrupt the fault current.

$39,000 of the above is requested to purchase miscellaneous parts and materials which reflec igh costs and the increasing maintenance needed due to normal aging of SWPA equipment.

$25,000 of the above is requested to purchase three potential transformers.

(3) Test Equipment . . . . . .$ 35

This $35,000 is necessary to replace and upgrade a part of SWPA's test equipment. This is n ssitated by the fact that the new type equipment now in operation cannot be adequately maintained with t present test equipment.

(4) Electronics Equipment Replacement . . . . . $ 173

$100,000 of the above is to replace the tube type ARKANSAS UHF Telecommunication System whic s noise prone, expensive to repair, and inadequate in size to carry necessary data and voice systems.

$18,000 of the above is to install a VHF radio station at Clinton, Missouri, Substation to a in the maintenance of the Clinton-Truman Dam Transmission line.

$20,000 of the above is to install automatic carrier relay testing to insure proper relaying our isolated substations. This will be interfaced with our SCADA system for monitoring.

$30,000 of the above is to install a tower and a building at Magazine Mountain Radio Sta n to replace 60' pole and galvanized building.

$5,000 is to increase the wattage of SWPA 172.775 MHz radio transmitter at Chimney Hill Magazine Mountain to give better coverage.

(5) Vehicles . . . . . $ 255
This $255,000 is necessary to replace vehicles, tractors, trailers, and modification of e.

Vehicles are scheduled for replacement as follows:

Sedan Delivery	$20
Light Trucks	81
Heavy Trucks	45
Trailers and Off-Highway Equipment	5
Tractors, Light	28
Tractors, Heavy	26
Modifications	17
Other	33

Power Marketing
Southwestern Power Administration - Continuing Fund
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Continuing Fund Emergency Expenses	...	...	...	...
Total	...	...	...	...

Authorization: 16 U.S.C. 825s

The Southwestern Power Administration Continuing Fund of $300,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southwestern area, is available to defray emergency expenses necessary to insure continuity of service.

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DEPARTMENT OF ENERGY

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

WESTERN AREA POWER ADMINISTRATION

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE -

COLORADO RIVER BASINS FUND - EMERGENCY FUND

VOLUME 5

TABLE OF CONTENTS

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Department of Energy
Proposed Appropriation Language

Construction, Rehabilitation, Operation and Maintenance,
Western Area Power Administration

For carrying out the functions authorized by title III, section 302(a)(1)(E) of the Act of August 4, 1977 (Public Law 95-91), [other than the Upper Colorado River Storage Project, and for operation and maintenance of electric power transmission facilities, and power marketing including purchase power and wheeling, as authorized by law,] and other related activities including conservation and renewable resources programs as authorized,1/ including the purchase of passenger motor vehicles (not to exceed [17 of which 16] 10 of which 5 are for replacement only)2/; [$138,502,000] $210,774,000 to remain available until expended, of which [$124,200,000] $135,200,000 shall be derived from the Department of the Interior Reclamation Fund and [$600,000] $680,000 shall be derived from the Colorado River Dam Fund for power marketing and transmission expenses of the Boulder Canyon [Project:] Project; Provided, That the amount appropriated, $39,510,000 shall be available for Upper Colorado River Storage construction.3/ (Energy and Water Development Appropriation Act, 1981; additional authorizing legislation to be proposed.)

Explanation of Change

1/ Language is added to recognize Western's participation in conservation and renewable resources programs in accordance with National policy.

2/ This language is required by 31 U.S.C. 638c in order to use appropriated funds for the purchase of passenger motor vehicles. Vehicles that are to be replaced will meet mileage or age standards set forth in FPMR 101-38-902.

3/ Language added to consolidate the construction activity for the Upper Colorado River Storage Project with other Western construction activities, thereby bringing together all construction activities under a single account in order to simplify the financial management and accounting process. The expenses were previously shown under the Colorado River Basins Power Marketing Fund.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Construction, Rehabilitation, Operation and Maintenance -
Western Area Power Administration
(In thousands of dollars)

	FY 1981	FY 1982
Appropriation	$138,502	$210,774
Proposed Supplementals	2,900	...
Subtotal, Budget Authority	141,402	210,774
Receipts and Reimbursements		
Unobligated Balances, Start of Year	15,239	...
Unobligated Balances, End of Year	...	...
Credits (net billings) from Power Users	15,297	11,235
Total, Obligations	$171,938	$222,009

DEPARTMENT OF ENERGY
FY 1982 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

WESTERN AREA POWER ADMINISTRATION

	FY 1980 Actual	FY 1981 est.	FY 1982 est.
Executive level I	—	—	—
Executive level II	—	—	—
Executive level III	—	—	—
Executive level IV	—	—	
Executive level V	—	—	—
Subtotal	—	—	—
ES-6	—	—	—
ES-5	1	1	1
ES-4	2	2	2
ES-3	1	1	1
ES-2	—	—	—
ES-1	2	2	2
Subtotal	6	6	6
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—	—	—
GS-18	—	—	—
GS-17	—	—	—
GS-16	—	—	—
GS/GM-15	13	18	18
GS/GM-14	37	41	41
GS/GM-13	76	86	86
GS-12	126	152	180
GS-11	168	168	171
GS-10	8	8	7
GS-9	55	67	71
GS-8	10	10	11
GS-7	50	74	88
GS-6	43	44	45
GS-5	54	64	82
GS-4	45	63	72
GS-3	29	19	13
GS-2	3	2	1
Subtotal	717	816	886
Ungraded	404	444	454
Total permanent positions	1,127	1,266	1,346
Unfilled positions, end of year	-1	—	—
Total permanent employment end of year	1,128	1,266	1,346

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
WESTERN AREA POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Western Area Power Administration.....	122,800	105,627	138,502	138,502	210,774	210,774
Proposed Supplemental.	---	---	2,900	2,755	---	145
Total, Western Area Power Administration	122,800	105,627	141,402	141,257	210,774	210,919

PROGRAM OVERVIEW
Western Area Power Administration

Western Area Power Administration (Western) is responsible for the Federal electric power marketing and transmission functions in 15 central and Western states encompassing a 1.3 million-square-mile geographical area. Western is responsible for the sale and distribution of power to 464 wholesale customers consisting of cooperatives, municipalities, public utility districts, private utilities, Federal and State agencies, and irrigation districts, which provide service to millions of retail power customers in all or part of the states of Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, New Mexico, Nevada, North Dakota, South Dakota, Texas, Utah and Wyoming. Western is responsible for the operation and maintenance of about 16,000 miles of transmission lines, over 200 substations, and various appurtenant power facilities in the above geographic area, and also for construction and operation and maintenance of additional Federal transmission facilities that may be authorized in the future. Electric power marketed by Western is generated by the Water and Power Resources Service, the Corps of Engineers, and the International Boundary and Water Commission in Texas, all of which operate some 48 hydropower generating plants in Western's service area with a current installed generating capacity of 8,065,144 kilowatts. Additionally, Western markets the United States' entitlement from the large Navajo coal-fired plant near Page, Arizona.

Major goals of Western are to market power at rates consistent with sound principles of economy and efficiency which will enable timely repayment of capital investment, operating costs and other obligations; to operate and maintain the transmission system in order to minimize interruptions of customer service due to equipment failures or other malfunctions; to manage the marketing program with emphasis on conservation and renewable resources programs; and full implementation of environmental concerns in management of Western's resources. Additionally, an active fuel displacement program will continue by supplying hydropower during peak load periods replacing combustion generation. This could result in an estimated equivalent savings of four to seven million barrels of oil annually for FY 1981 and FY 1982. Revenues realized will appreciably exceed the costs of energy purchased for fuel displacements.

During FY 1980, Western marketed an estimated 37.3 million megawatt hours of hydroelectric energy resulting in power sales revenues estimated at $365,121,000. Estimated energy sales in FY 1981 is 38.5 million megawatt hours and 38.8 million megawatt hours in FY 1982. Western estimates that revenues from the Water and Power Resources Service and Corps of Engineers hydroelctric and thermal projects located in its service area will amount to $377,686,000 in FY 1981

and $388,022,000 in FY 1982. These power revenues will be utilized to defray annual operation and maintenance expenses on projects which operate on a self-financing basis. In addition, revenues above operating requirements are applied to interest and to repayment of the Federal investments allocated to the power function.

The 1982 budget request for the Western Area Power Administration is predicated upon Western's goal to implement national energy policy including conserving energy and reducing dependence on foreign oil. Western's strategy to attain this goal is to provide reliable electric service to its customers while optimizing the use and development of renewable resources and conservation. To carry out program plans and objectives associated with system operation and maintenance, planning and management of energy supplies, construction of facilities and conservation and development of renewable resources, Western requests appropriations totaling $211,274,000 for fiscal year 1982. The increase in the 1982 budget request from the 1981 request of $142,250,000 is primarily due to costs associated with the program to upgrade the reliability of the Federal power system including the construction of a joint Federal/non-Federal 345-kV transmission system through western Colorado; participation in the Energy Conservation and Renewable Resources Program to achieve program objectives in compliance with the President's June 1979 energy conservation directive; increased costs due to the recent transfer of functions, facilities and property from the Water and Power Resources Service to Western; costs associated with providing power system security, reliability, and energy transfer capability through the system; installation of asynchronous ties, and the construction of regional interties.

PROGRAM OVERVIEW
Construction, Rehabilitation, Operation and Maintenance
Western Area Power Administration

The Western Area Power Administration (Western) is the Federal electric power marketing agency for the generating projects of the Water and Power Resources Service (Service), the Corps of Engineers, and the International Boundary and Water Commission's power plant in Texas. These projects encompass some 15 central and western States (portions of which are under Colorado River Basins Power Marketing Fund). Western sells the Federally-generated hydroelectric power at wholesale rates to publicly and cooperatively owned electric distribution utilities. Long-term contracts allow for rate adjustments to insure that revenues meet annual costs of operation and maintenance of generating and transmission facilities and repay all the power investment with interest and the Government's irrigation investment which is beyond the water users' repayment capability in keeping with statutory requirements.

Under the Construction, Rehabilitation, Operation and Maintenance account, Western will operate and maintain approximately 13,000 miles of high voltage transmission lines and associated substations and switchyards. Western is also responsible for construction and the rehabilitation of transmission facilities including new transmission lines, substations, maintenance and storage areas, and other essential system additions and modifications to existing facilites under this program.

During FY 1980, Western, under this fund, marketed an estimated 26.3 million megawatt hours of hydroelectric energy to over 400 wholesale power customers resulting in power sales revenues estimated at $219,889,000. Energy sales, under this fund, are estimated at 27.8 million megawatt hours in FY 1981 and 27.8 million megawatt hours in FY 1982. This will result in estimated power sales revenues totaling $221,410,000 and $216,627,000, respectively. Additionally, an active fuel conservation program will continue by supplying hydropower during peak load periods replacing combustion turbine generation. Revenues realized will appreciably exceed the costs of energy purchased.

In FY 1981 and FY 1982, Western activities include continued work on system maintenance, replacements, construction of transmission lines, substations, switchyard additions and transmission interconnecting facilities including continuing cooperative work efforts with non-Federal entities. Additionally, Western is implementing a Conservation and Renewable Resources Program in FY 1982 in accordance with National policy. Western's overall program objective is directly based on the National goal of meeting at least 20 percent of the country's energy needs with solar and renewable resources by the year 2000.

Western intends to meet or exceed the goal by satisfying the equivalent of 20 percent or more of its projected energy sales via conservation and new renewable resource activities. This objective is roughly the same as displacing the need for several baseload fossil fuel/nuclear generating units. Full implementation of Western's total potential activities has the collective impact of saving the equivalent of over 100,000 barrels of oil per day.

The increase in budget authority from FY 1981 to FY 1982 is primarily due to increased operation and maintenance workload and equipment requirements brought about by the recent transfer of facilities, property and functions from the Service to Western, increased resources to perform additional power marketing, engineering, and preventive maintenance on Western's aging and expanding power systems, and increased constructive activity associated with joint Federal and non-Federal construction of 345-kV transmission additions in western Colorado and construction of east/west ties in eastern Montana and the Colorado/Wyoming area.

In future years, Western will continue to pursue the goal to implement national energy policy by providing reliable electrical service while optimizing the use and development of renewable resources and by the conservation of energy. By maximizing the use of the Federal transmission system and hydro resources, Western can attain the highest levels of efficiency with respect to resources and capital for the Government as well as for its customers. Western, through its power marketing program, is committed to producing the greatest value and benefit to its customers by reducing or, in some cases, eliminating the use of nonrenewable re-sources.

Imperative to Western's mission objectives is the maintenance of a transmission system that can continue to deliver reliable and adequate Federal power. The delivery system will allow for the transfer of energy from renewable resources and displacement of oil-fired generation. The transmission system will also be the key to Western's conservation efforts. The efforts will focus on actively promoting the development and implementation of conservation programs and projects, by Western and its customers, to demonstrate the efffectiveness of such measures. Such promotion will be characterized by direct Western assistance to customers in order to help them establish and implement their programs. Implementation of renewable energy initiatives within the Western power marketing and transmission system will focus on maximizing opportunities to demonstrate and commmercialize renewable resource technologies (wind farms, solar installations, etc.) in concert with other DOE organizations.

Construction, Rehabilitation, Operation and Maintenance -
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Power marketing - Western Area Power Administration (Western)				
Construction:				
Operating expenses	$ 27,179	$ 36,275	$ 36,912	$101,400
System operation and maintenance:				
Operating expenses	37,011	41,227	45,452	56,174
Purchase power and wheeling:				
Operating expenses	58,610	61,000	61,000	53,200
Total, Operating expenses	$122,800	$138,502*	$143,364	$210,774

Authorization: Sec. 302(a)(1)(E), P.L. 95-91 and various project authorizations.

Summary of Changes

FY 1981 Appropriation enacted	$138,502
Built-in increases and decreases:	
Annualization of 90 FTP positions for 9 months	+ 1,688
Pay cost increases	+ 3,174
FY 1982 Base	$143,364
Program Increases and decreases	
Net increase for Upper Colorado River Storage Project including 345-kV additions in western Colorado	+35,906
Contract award for East/West Intertie	+ 6,707
Contract awards for various transmission line and substation additions and system communication and control additions	+16,015
Net increase for on-going transmission line improvement contracts	+ 5,860
Net increase for replacements and additions, materials, supplies and other operating expenses	+10,722
Purchase power and wheeling program decreased cost for energy purchases	- 7,800
FY 1982 Budget Request	$210,774

* Excludes a pending supplemental request of $2,900,000.

	FY 1981 Appropriation	FY 1982 Request
Construction	$ 36,275,000	$101,400,000

The FY 1982 request for construction is $101,400,000, a $65,125,000 increase over the amount appropriated in FY 1981. The following tabulation shows a comparison of the FY 1981 appropriation to the FY 1982 request. This table is followed by statements for construction-type projects funded from operating expenses.

Operating Expenses Construction	FY 1981 Appropriation	Change ($ in thousands)	FY 1982 Request
Central Valley	$ 2,865	$+ 2,505	$ 5,370
Washoe	73	+ 227	300
Parker-Davis	585	- 45	540
Pacific Northwest-Pacific Southwest Intertie	...1/	+ 775	775
Pick-Sloan Missouri Basin Transmission Division	17,315	16,293	33,608
Transmission Line Improvement Program	15,437	+ 5,860	21,297
Upper Colorado River Storage Project	...2/	+39,510	39,510
Total, construction	$ 36,275	$+65,125	$101,400

1/FY 1980 carryover funds available to cover expenses.

2/ FY 1981 appropriation included in Colorado River Basins Power Marketing Fund. For FY 1982, the construction activity for the Upper Colorado River Storage Project has been combined with other Western construction activities into a single construction activity under this appropriation account to simplify the financial management and accounting process.

Project title: Central Valley
Location: California

Description and justification: The Central Valley transmission system consists of 1,322 circuit miles of 69- to 500-kV transmission lines which interconnect seven powerplants, one pumping plant, and nine major substations. Western markets electric power to preference wholesale customers located in California and administers a sales, transmission, and interchange contract with the Pacific Gas and Electric Company, the major private power utility in the area.

FY 1982 budget request . . . . . $ 5,370,000

Work proposed: Request provides for power factor correction work, award of contracts for construction of transmission service to Pacheco Pumping Plant, a feature of the San Felipe Division of the Central Valley Project presently under construction by the Water and Power Resources Service, and for Keswick Switchard, Stage 02, minor modifications to substanitally completed facilities and replacement and/or installation of equipment such as circuit breakers at the Folsom switchyard, interrupters at the Shasta switchyard, and remote automatic telemetering equipment at various metering points. Funds have also been included for planning studies, environmental activities, collection of field data and other preconstruction engineering activities.

Project title: Washoe
Location: California-Nevada

Description and justification: The Washoe Project is located in the Carson and Truckee River Basins of Nevada and California. The main features of the project are the Stampede and Watasheamu Dams. A powerplant facility is being constructed by the Service at Stampede Reservoir. Western proposes construction of a 12-mile, 115-kV transmission line which will provide transmission service for energy produced from the powerplant.

FY 1982 budget request . . . . . $ 300,000

Work proposed: The request provides funds for completion of construction of the required facilities late in fiscal year 1982.

Project title: Parker-Davis
Location: Arizona - California - Nevada

Description and justification: The Parker-Davis Project contains over 1,600 miles of transmission lines and over 2,000,000 kVA of installed capacity at substations in Arizona, California, and Nevada. The facilities are constructed to carry power generated at Service hydroelectric plants at Davis Dam and Parker Dam to various load centers of preference customers.

FY 1982 budget request . . . . . $ 540,000

Work proposed: For completion of contract payments for purchase of a mobile 45 MVAR shunt capacitor bank. Also provide for planning studies for potential future power system interconnections.

Project title: Pacific Northwest - Pacific Southwest Intertie
Location: Arizona - Nevada - California

Description and justification: This project, located in parts of Arizona, California, and Nevada, consists of the part of the extra high voltage Pacific Northwest-Pacific Southwest Intertie which is

assigned to Western Area Power Administration. In conjunction with the Bonneville Power Administration's portion of the Intertie, these facilities would permit the sale of power from the Northwest to California, Arizona, and Nevada, together with the seasonal exchange of capacity between the Pacific Southwest and the Pacific Northwest.

The plan is designed to integrate the Federal hydroelectric projects in the Northwest, in northern California and in the Colorado River area. The investment in construction facilities would be repaid with interest within 50 years from the time the lines become revenue-producing from revenues received through use of the Intertie facilities. Funds to initiate construction were appropriated in FY 1965. Construction of the 500-kV, 345-kV transmission lines authorized as part of the Pacific Intertie are complete and in operation.

Construction of the Oregon Border-Mead, DC transmission line and terminal facilities was deferred in 1969, primarily as a result of lack of customer interest. Recent customer interest has developed to support construction of a DC terminal in the Phoenix area and temporary conversion of the Mead-Liberty 345-kV AC line to direct current operation to be followed by later construction of a Phoenix-Mead 1,000-kV DC line.

FY 1982 budget request . . . . . $ 775,000

Work proposed: Provides for preliminary planning studies and environmental analysis. Construction will also be completed on the Mead O&M complex renovation.

Project title: Pick-Sloan Missouri Basin Transmission Division
Location: North Dakota, South Dakota, portions of Colorado, Iowa, Minnesota, Missouri, Montana, Nebraska, and Wyoming

Description and justification: The transmission facilities of the Pick-Sloan Missouri Basin Program interconnect Federal hydroelectric powerplants in Western's operational area and deliver power for irrigation pumping and sales to municipalities, cooperatives, private utlities and wholesale customers of Western. This major power marketing system is operated by two Western Area Offices; the Loveland-Fort Collins Area for portions of this program in Wyoming, Colorado, and Nebraska, and the Billings Area Office for portions within North Dakota, South Dakota, Iowa, Minnesota, and Missouri.

FY 1982 budget request . . . . . $ 33,608,000

Work proposed: In the late 1960's and early 1970's, the eastern and western United States transmission systems were synchronized and operated interconnected through closure of the east/west ties at Fort Peck and Yellowtail substations in eastern Montana and Stegall substation in Western Nebraska. These interconnecting transmission lines did not provide sufficient transmission capacity to maintain integrated operations due to large unscheduled flows between the two large generating masses. These unscheduled flows put

excessive stress on the relatively weak east/west ties, requiring separation. In addition, severe voltage excursions on the systems adjacent to the separation points became intolerable and eventually resulted in abandonment of the interconnected a.c. operations. This operation resulted in Western being the only major electrical system in the United States with substantial amounts of transmission capability in both systems. Installation of a 200-400 mW a.c.-d.c.-a.c. tie at Miles City, Montana connected into Western's existing transmission system will provide a closed connection between the systems and allow power transfers in either direction. Construction of nine Colorado/Wyoming ties and related facilities will also provide an additional closed connection between the eastern and western systems. These ties will resolve major local operating problems, enhance system reliability and provide transfer capability to promote short-term energy deficiencies, diversity exchanges and oil conservation programs.

The FY 1982 request includes funds in the amount of $7,207,000 for supervision, inspection, contract administration and contract earnings for a.c.-d.c.-a.c. ties; $5,830,000 for completion of the 328-mile long Miles City-New Underwood 230-kV transmission line and terminal facilities and $4,060,000 for the Loveland-Fort Collins operation and maintenance complex.

In addition, funds of $16,511,000 are requested to continue construction of the energy control system installation for Eastern Division supervisory and generation control, for a joint microwave system for substation additions at Huron, South Dakota, Fargo, North Dakota, Brookings, South Dakota; and for completion of the Brookings Tap-Brookings 230-kV transmission line. System studies and modifications on additions to completed facilities will be continued.

Project title: Transmission System Improvement Program
Location: Western-wide

Description and justification: Western will continue the wood pole transmission line and associated facilities rehabilitation, replacement, and upgrade program. Substations and switchyards will continue to be upgraded.

FY 1982 budget request $21,297,000

Work proposed: Work will continue on upgrading the Liberty-Coolidge 115-kV transmission line and terminal facilities ($1,755,000), the Cottonwood-Elverta No. 3 Rehabilitation ($8,300,000), the Folsom-Nimbus Rehabilitation ($1,100,000), the Beaver Creek-Bijou upgrade ($610,000) and the spray treatment of wood poles ($715,000).

In addition work will be conducted on the following transmission line upgrades:

Parker-Blythe 151-kV Transmission Line Upgrade: Provides for engineering and design and specification work to upgrade the Parker-Blythe transmission line including the Parker and Blythe substations ($435,000).

Work will include the addition of transformers, circuit breakers and switches. These facilities will strengthen the system and enhance the reliability of the western Arizona system.

Upgrade of Liberty and Coolidge Substation 230-kV Bays: Preliminary design and specification data will be collected and assessed for addition of circuit breakers and switches ($260,000). These upgrades are proposed to meet increased operational requirements and anticipated increases in loads in the southern Arizona portion of the Western system.

Cheyenne-Laramie Upgrade: The 142-mile-long Seminoe-Cheyenne 115-kV transmission line is over 40 years old and is in need of replacement. The first stage of proposed construction is the upgrading of the 48-mile Cheyenne-Laramie section, which includes installation of 230-kV line terminals and associated equipment. FY 1982 funds ($1,130,000) are requested for environmental activities, land acquisition, designs, and award of the construction contract.

Beaver Creek-Wray Upgrade and Sidney-Beaver Creek Upgrade: Studies have determined a need for transmission system enhancement to meet load growth and eliminate reliability problems in eastern Colorado. Funds ($500,000) are required in FY 1982 to begin environmental activity, field investigations and land acquisition for upgrade of 75 miles of 115-kV transmission lines to 230-kV H-frame wood or steel lattice construction and 36 miles of the Sidney-Sterling-Beaver Creek 115-kV circuit to 230 kV.

Substation Reliability Additions: Various substations require modifications or additions to improve system reliability, to relieve overloading and prevent power outages. These substations include: Groton, Fargo, Pilot Butte, Heart Mountain and Poudre. Other additions or modifications will be made to completed facilities. ($3,804,000).

Other System Studies and Modifications: Funds have been requested for system studies, alignment surveys, environmental and other activities for facilities which may be required for system upgrade and reliability. ($408,000).

Project title: Upper Colorado River Storage Project - Construction
Location: Utah, Colorado, New Mexico and Wyoming

Description and justification: The Transmission Division includes transmission lines, substations, switchyards, and other facilities to provide for the interconnection of storage project powerplants with each other, with participating project power facilities, with other Federal powerplants, and with the electrical facilities of the major investor-owned power companies in the Colorado River Basin area so that the greatest practicable amount of firm power and energy can be produced and delivered to the load centers for sale. Completed features are to be operated by the Government with joint participation by others on some of the facilities.

FY 1982 budget request. $39,510,000

Work proposed: Provides for the construction of a new 345-kV transmission line under a joint participation arrangement with Colorado-Ute Electric Association. The Federal share of this program for FY 1982 is estimated to be $35,275,000. Western and Colorado-Ute are jointly participating in the construction of a new 310-mile 345-kV double-circuit transmission line from Rifle to San Juan/Shiprock. Included also in the joint planning are the uprating or rebuilding to 345 kV of existing lower-voltage lines from Shiprock to Four Corners and from Curecanti to Montrose, as well as substation additions at Rifle, Montrose, Curecanti, Lost Canyon, Shiprock, and Four Corners. In the section from Craig to Rifle, where Colorado-Ute already has a 345-kV transmission line, Western is planning to uprate its existing 230-kV line to 345 kV. Completion of these facilities will increase the capability of the system to transmit power and energy for loads, interchanges, and oil conservation, and will improve system reliability. Other items in the FY 1982 request include the addition of a 250 MVA autotransformer at Flaming Gorge Switchyard, the construction of a Western interconnection to the Colorado-Ute transmission system at Lost Canyon, Colorado, and Federal participation on the Hayden-Blue River 345-kV transmission line being constructed by Tri-State G&T Association. Funds have also been included for completion of Ault Substation, Stage 3; Shiprock Substation, Stage 2, and additions for energy efficiency at the Montrose District Office Complex. Minor modifications to completed work and planning studies of future facilities will also be continued.

Construction, Rehabilitation, Operation and Maintenance
Western Area Power Administration
Construction Schedule
(In thousands of dollars)

Project Item	Estimated Total	Total to 9-30-80	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Balance to Complete
Central Valley	$ 187,737	$ 62,403	$ 2,865	$ 5,370	$ 9,313	$ 2,855	$ 415	$ 565	$102,951
Washoe	600	31	73	300	-	-	-	-	196
Orland	400	-	-	-	-	-	-	-	400
Parker-Davis	95,506	78,188	585	540	85	250	325	15,533	-
Pacific Northwest-Pacific Southwest Intertie	526,243	79,263	- 1/	775	665	100	100	100	445,240
Pick-Sloan Missouri Basin Transmission Division ..	621,246	382,190	17,315	33,608	42,257	39,555	535	44,275	25,511
Upper Colorado River Storage	126,578	- 2/	- 2/	39,510	18,350	17,190	190	4,690	27,648
Energy Transfer Program ..	123,792	-	-	-	4,647	28,325	485	51,335	-
Transmission Line Improvement Program	215,132	- 3/	15,437	21,297	27,583	40,625	950	39,502	27,738
Total, Construction (BA) 4/.....	$1,897,234	$602,075	$36,275	$101,400	$102,900	$128,900	$1 000	$156,000	$629,684

1/ Construction work in FY 1981 financed by prior year carryover funds.

2/ FY 1981 appropriations of $3,548,000 and total to 9-30-80 included in Colorado River Basins er Marketing Fund account.

3/ Excludes cost prior to FY 1981 which were funded under the Operation and Maintenance activi

4/ Federal funds only.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Colorado River Basins Power Marketing Fund: 89-4452-0-3-271
Upper Colorado River Storage Project - Construction

(Tabular dollars in thousands. Narrative material in whole dollar

1. Title and location of project: Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV Transmission System - Colorado and New Mexico

2. Design work initiated: Late 1980

3. Date construction starts: Spring 1982

4. Energization dates:
   Initial facilities: Fall 1985
   Hayden-Craig Segment: Fall 1989

5. Previous cost :imate: New project

6. Total cost es ıte: $234,000
   Federal par ıpation (76,500)
   Non-Federal :ticipation (157,500)
   (anticipat
   Date: June 1

The proposal is for Federal financial participation in joint development of new and uprated :ilities in western Colorado and northern New Mexico consisting of approximately 550 miles of 345-kV transmissi lines and nine substations. The initial requirement is part of a long-range phased development by power entities within : western Colorado, northwestern New Mexico region. Western Area Power Administration (Western) and, Colorado- Electric Association have planned jointly to develop associated facilities that serve each party's long-range ne , including additional circuits between the Hayden-Craig area and the Shiprock-San Juan-Four Corners area.

Background and Purpose: Joint planning studies conducted by Western and the major electric ılities of Arizona, Colorado, and Utah indicate the requirement of additional transmission systems between the len-Craig area and the Shiprock-San Juan-Four Corners area. This system expansion is required to provide for tran ssion of power from planned uprated existing resources and future conventional hydro and coal-fired generating ılities and future pump storage generating facilities to growing load centers. Future hydro additions are estimate) produce approximately 1,600 megawatts by the early 1990's. Additional transmission facilities would also enhance conservation, reduce purchase power costs, increase revenues from wheeling service, reduce problems associated w loop flows, and improve system reliability.

Requirement:

The proposed transmission system expansion consists primarily of:

- Constructing two new 345-kV circuits from Rifle, Colorado, to the Shiprock-San J area.
- Uprating or rebuilding to 345-kV the existing 230-kV circuits from Rifle to Crai o Hayden and from Shiprock to Four Corners.
- Rebuilding to 345-kV the existing 115-kV circuit from Montrose to Curecanti.

These facilities, as proposed, are subject to mutual agreement of Western and Colorado- Electric Association and comprehensive environmental analysis. Construction of the facilities would be the ponsibility of the party holding the greatest interest unless otherwise mutually agreed by the respective partie

Benefits:

Exchange: Because of transmission limitations, it is not possible to accomplish the de ed contractual exchange of 340 mW between Western and Salt River Project during off-peak hours. It is estimate hat 175,000,000 kWh could be exchanged each year at a wheeling rate of 2.3 mills per kWh for annual revenues of $,000.

Purchase of Energy: Transmission capacity from this project would permit power to be p hased in Colorado, Montana, Utah and Wyoming to firm up Colorado River Storage Project (CRSP) requirements. It is imated that 75 mW for 10 hours per pay could be purchased at a savings of 5 mills per kWh or annual savings c 1,370,000.

Oil Conservation: It is estimated that 100 mW for 10 hours per day could be purchased transmitted for oil conservation for a gain of 10 mills/kWh or annual revenues of $3,650,000. This would alsc sult in savings of 870,000 barrels of oil each year.

Transmission Service: With the transmission capacity provided by the project, Western ld accommodate utilities' requests to transfer power from coal-fired and hydro generation in the Rocky Mountain a Pacific Northwest areas to replace oil-fired generation in Arizona and California. It is estimated that Wester ould be able to transmit at lease 75 mW during off-peak hours at 2.3 mill wheeling rate for annual revenues of $775 0. This would also save about 750,000 barrels of oil per year.

Transmission of New Federal Capacity: Rewinding Glen Canyon units will provide an additiona 40 mW by the summer of 1982, and rewinding of Blue Mesa units will provide an additional 24 mW by the winter of 198 This transmission project should provide 50 percent of the required transmission system required to market thi ditional power. Annual benefits are estimated at 50 percent of $6.10 per kW (CRSP wheeling rate) for $871,000.

Reliability and System Improvement: Substantial benefits result from improved reliability i yoming, Colorado, Utah, and Arizona and accommodation of loop flows in the "Western Donut"; however, no dollar value assigned to these benefits.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Construction, Rehabilitation, Operation and Maintenance: 89-5068-0-2-
Pick-Sloan Missouri Basin Transmission Division
(Tabular dollars in thousands. Narrative material in whole dollars

1. Title and location of project: A.c.-d.c.-a.c. Ties - Eastern Montana, Wyoming/Colorado

2. Design work initiated: Fall 1980

3. Date construction starts: Spring 1982 (Miles City)
Fall 1982 (Colorado/Wyoming)

4. Energization dates: Spring 1984 (Miles City)
Fall 1985 (Colorado/Wyoming)

5. Previous cost esti : New project

6. Total cost estimat $65,976 (in thousands)
Federal particip n (65,976)
Date: June 1980

Work will be performed by contract. Project provides for acquisition and installation of 200 400 mW, a.c.-d.c.-a.c. ties at Miles City, Montana and a Colorado/Wyoming site, and construction of related faciliti

In the late 1960's and early 1970's, the eastern and western United States transmission syste ere synchronized and operated interconnected through closure of the east/west ties at Ft. Peck and Yellowtail in e rn Montana and Stegall in western Nebraska. The interconnecting transmission lines consisting of a 161-kV line at F eck and single 230-kV lines at Yellowtail and Stegall did not provide sufficient transmission capacity to maintain grated operations due to large unscheduled flows between the two large generating masses. Unscheduled flow for sys changes in either area would stress the relatively weak east/west ties, requiring separation. Severe voltage excurs on the systems adjacent to the separation points became intolerable and eventually resulted in abandonment of rconnected a.c. operations. This operation resulted in Western being the only major electrical system in the ted States with substantial amounts of transmission on both sides of the east/west separation. The inability transfer large blocks of power across Western's system has reduced the efficiency of the Federal system operations. e project includes a.c.-d.c.-a.c. facilities at Miles City and related facilities.

Benefits:

Installation of a.c.-d.c.-a.c. ties at Miles City, Montana, and a Colorado/Wyoming site conne l into Western's existing transmission system would provide a closed connection between the systems and allow r transfers in either direction. Construction of the a.c.-d.c.-a.c. ties would resolve local operating problems, e ce system reliability, and provide transfer capability to further promote diversity exchanges and oil conservation p ams. Recently, the National Electric Reliablity Council (NERC) reported that the western United States utilitie st still depend on

substantial amounts of oil-fired generation, while eastern systems have coal-fired surpluses
oil generation. Additional east/west transfer capability is needed to transmit these surplus
generators in Arizona/California. Utilization of 50 percent of a 200 mW d.c. tie would enabl
annual savings of $10,000,000 to $20,000,000. Another major benefit for east/west interconne
to balance load and resource obligations of other regional power suppliers that serve custome
east/west separation.

With its high availability rate (better than 99 percent), the ties would also provide reserve
of both planning and spinning reserve obligations. Sharing reserves in this method would red
capacity required in a standby mode and allow its marketing on an interruptable basis. Insta
designed a.c.-d.c.-a.c. facility has no environmental impact and allows full utilization of c
transmission system.

	FY 1981 Appropriation	FY 1982 Request
Systems Operation and Maintenance. . . .	$41,227,000	$56,174,000

The FY 1982 request for system operation and maintenance is $56,174,000, a $14,947,000 increase over the amount appropriated in FY 1981. The tabulation below shows a comparison of the FY 1981 appropriation to the FY 1982 request by major categories within the program:

Systems Operation and Maintenance	FY 1981 Appropriation	Change	FY 1982 Request
		($ in thousands)	
Transmission System:			
Operation & Maintenance of Transmission Lines	$ 7,201	$+3,299	$10,500
Operation & Maintenance of Substations	8,867	+2,971	11,838
Operation & Maintenance of Communications Systems	577	+ 376	953
Subtotal - Transmission System	16,645	+6,646	23,291
System Operation:			
Dispatching	714	+ 811	1,525
Power Marketing	1,411	+ 315	1,726
Power Billing & Collecting	1,927	+ 301	2,228
Subtotal - System Operation	4,052	+1,427	5,479
Energy Conservation & Renewable Resources Program	80	+ 864	944
Administrative & General Expense	11,804	+2,596	14,400
Replacements & Additions	8,646	+3,414	12,060
Total - Systems Operation & Maintenance (BA)	$41,227	$+14,947	$56,174

Narrative Justifications

Transmission System:

FY 1982 Budget Request. $23,291,000

This activity includes the operation and maintenance of approximately 13,000 miles of transmission lines, substations and the communication control system. Additional facilities which Western must maintain in FY 1982 include 228 miles of the Miles City-New Underwood transmission line, the Miles City Substation, approximately 23 substations transferred from the Water and Power Resources Service for full funding in FY 1982, and various substation additions. The FY 1982 Budget Request provides for additional full-time permanent positions and related costs, materials, supplies and associated other expenses required to operate and maintain Western's expanded transmission system. The FY 1982 Budget Request also includes $950,000 for erosion control and spray treatment of wood poles.

The operation and maintenance of the Transmission System consists of performing duties necessary to protect equipment and provide electric service to customers. Substations contain circuit breakers, switches, customer feeder terminals, transformers to change voltage levels, equipment to regulate voltages, relays for automatic protection, meters and associated electrical equipment. Operation and maintenance duties performed in substations consist of switching to de-energize lines and equipment during emergencies and for maintenance, isolating damaged equipment, restoring service to customers, meter reading and the maintenance of the electrical equipment. Transmission line maintenance includes ground or aerial line patrols for inspection purposes. Also included is the maintenance of all transmission lines, consisting of maintenance of structures, insulators, conductors, overhead ground wires, access road maintenance, right-of-way maintenance and weed control. The communication system consists of maintaining microwave equipment, radios, power line carriers, telemetering and other power system control equipment.

System Operation: FY 1982 Budget Request $5,479,000

This activity includes power system control and dispatching, power marketing, and power billing and collecting activities. The FY 1982 Budget Request includes funds for the operation of the expanded transmission system. Funds have been provided for additional full-time permanent employees to perform the system operations functions for the expanded system and for the Control Operation Center in the Sacramento Area which is funded by Western in FY 1982.

Power system control activities include the central control of the electric operation of the Federal transmission system, including load, frequency and voltage control of Federal generating plants; the operation of the central control centers; the modification and maintenance of the operations related computers, computer terminal equipment and computer programs; dispatching of power over the Federal transmission system; and coordinating the operation of the power system with other interconnected power systems.

Power marketing activities include forecasting regional power loads and planning resources to meet the loads. Resource planning involves the study of power capability of both existing and future generating projects, analysis of long-range water storage programs, and coordination of Federal and non-Federal power resources within the Western marketing areas. The study of power loads and resources resulting from interregional transmission connections is also a part of this activity.

The FY 1982 program provides personnel and contract funding to improve the regional resource planning process, develop energy requirements forecasts, implement and administer computer modeling of the resource planning process, prepare regional assessments of alternative and renewable resources for energy production, prepare studies and recommendations regarding use of existing and feasibility of additional interregional interties, and perform environmental and technical analysis of power resources.

Power billing and collecting activities consist of the negotiation and administration of contracts for power sales, wheeling, coordination, and other types of agreements; the planning, coordination, and review of plans for electric facilities to serve customers; computation of bills for power sales, interchanges, wheeling, and other accounts; the preparation of official data relative to deliveries and transmission of power; and development of Western's power and wheeling rates and revenue studies.

Energy Conservation and Renewable Resources
Program: FY 1982 Budget Request. . . . . $ 944,000

Request provides the initial program and requires additional full-time permanent positions and contract services to conduct studies directed toward energy conservation and renewable resource development activity. In FY 1982, Western will expand participation in small-scale cogeneration projects through preference customers. One or more "retail-level" conservation pilot programs (e.g.; residential conservation, solar water heating) will be evaluated and implemented through a small number of preference customer utilities to promote area load reduction and stimulate the development of small-scale energy technologies. In addition, Western will purchase and install renewable energy generation equipment at selected locations to provide technical verification of specific site capabilities for future renewable resources development. The budget also provides for participation in a comprehensive feasibility study for a large-scale renewable resource development project.

Administrative and General Expense:
FY 1982 Budget Request $14,400,000

Includes executive management, direction of power management functional activities related to power supply and scheduling, power resources and requirements, general system studies, customer service policy development, environmental analysis coordination, and public involvement activities. It also includes administrative support services consisting of programs, finance, personnel, equal employment opportunity, safety, procurement, supply and office services, audit functions, computer support, legal counseling and the expenses associated with these activities for the Western Headquarters, Area Offices and field activities.

Replacement and Additions:
FY 1982 Budget Request $12,060,000

Replacements and additions are units of property which are required for system operations and reliability. The replacements and additions which are provided for in the FY 1982 Budget Request are categorized as follows:

Substation rehabilitation: FY 1982 Budget Request . . . . . .($ 260,000)
This includes enlargement of the Devil's Lake Substation control building to accommodate new control facilities for system additions. Minor items such as surfacing substation yards will be accomplished.

Substation equipment: FY 1982 - Budget Request. . . . . .($5,118,000)
This provides for the replacement or addition of transformers, capacitors, circuit breakers and miscellaneous electrical equipment. These items replace equipment which has served its useful life or has failed. Equipment additions

Substation equipment: FY 1982 - Budget Request. . . . . .($5,118,000)
This provides for the replacement or addition of transformers, capacitors, circuit breakers and miscellaneous electrical equipment. These items replace equipment which has served its useful life or has failed. Included in the total is $900,000 for replacement of capacitors which contain polychlorinated biphenyls. This program is in compliance with the Toxic Substances Control Act, P.L. 94-469.

Mobile equipment: FY 1982 - Budget Request. . . . . .($1,445,000)
This item covers replacement or additions of transportation and heavy equipment which meet GSA replacement or safety replacement criteria. Equipment to be replaced will meet age and mileage or mileage standards for replacement. The equipment is required to properly operate or maintain the transmission system. Items planned for FY 1982 are: pickups, sedan deliveries, line trucks, mobile cranes, trailers, backhoe, graders, snow vehicles, tractors, etc.

Communication and control equipment: FY 1982 - Budget Request. ($3,654,000)
Provides for replacements and additions of telemetering, supervisory, carrier, radio, protective relaying and other equipment. Major items included are a supervisory control and automatic data acquisition system for improved control of substations. Acquisition of remote automatic telemetering equipment which provides for load frequency control for customer metering and system integrity will be underway.

Various maintenance facilities: FY 1982 - Budget Request. . .($970,000)
Provides for construction of various warehouse and storage areas and maintenance facilities. These facilities are required for storage of supplies, materials, equipment, and crew quarters. These buildings will also protect the specialized power transmission repair equipment and provide a work area for maintenance activities.

Tools and work equipment: FY 1982 - Budget Request . . . . .($613,000)
This provides for shop equipment, office equipment, and other miscellaneous tools required to properly operate and maintain the transmission system.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SYSTEM STATISTICS
Western Area Power Administration
(In thousands of dollars)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate
Generating Plants (No.) [1]	48	48	49
Generating capacity:			
Installed capacity (kW)	8,065,144	8,215,470	8,248,470
Substation: [2]			
Number	218	221	222
Capacity (kVA)	15,071,321	15,582,321	15,932,321
Available energy: (MWh)			
Net generation	33,181,320	34,785,715	34,876,835
Purchases	3,464,799	6,528,536	9,132,016
Energy available for marketing [3]	36,646,119	41,314,251	44,008,851
Transmission lines (circuit miles):			
500 kV	94.27	94.27	94.27
345 kV	1,361.27	1,361.27	1,361.27
230 kV	6,205.28	6,287.28	6,514.98
161 kV	1,039.05	979.05	979.05
138 kV	316.96	316.96	316.96
115 kV	5,724.98	5,724.98	5,724.98
69 kV and below	1,221.90	1,221.90	1,221.90
Total circuit miles	15,963.71	15,985.71	16,213.41
DOE revenues:			
Revenue from electric service [4]	$365,121	$377,686	$388,022

[1] Includes one coal-fired plant; others are hydroelectric. The additional plant scheduled on line in FY 1982 is first unit Mt. Elbert Power Plant, Fryingpan-Arkansas project.
[2] Includes only substations totally owned by Western.
[3] Includes sales, losses, and interchange deliveries.
[4] Includes sales, wheeling, and other revenues.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
Western Area Power Admininstration

Project	State	No. of Plants	Installed Capacity(MW)	FY 1980 Actual Power(GWH)	FY 1981 Estimated Power(GWH)	FY 1982 Estimated Power(GWH)
Power Marketed						
Boulder Canyon	AZ	1	670	699	699	657
	CA	-	-	2,882	3,767	3,520
	NV	-	675	784	784	737
Subtotal		1	1,345	4,365	5,249	4,914
Central Valley	CA	10	1,731	7,565	7,748	8,038
Subtotal		10	1,731	7,565	7,748	8,038
Collbran	CO	2	14	55	52	52
Subtotal		2	14	55	52	52
Colorado River Basin	AZ	1	547	928	821	821
(Navajo)	CA	-	-	2,799	2,487	2,487
	NV	-	-	96	85	85
Subtotal		1	547	3,823	3,393	3,393
Colorado River Storage	AZ	1	950	1,041	910	1,104
	CA			1,113	1,038	1,496
	CO	3	208	1,658	1,655	1,651
	NV	-	-	316	192	344
	NM	-	-	907	1,032	895
	UT	1	108	1,704	1,971	1,601
	WY	-	-	516	516	516
Subtotal		5	1,266	7,254	7,314	7,607
Falcon-Amistad	TX	1	32	90	90	90
Subtotal		1	32	90	90	90
Fryingpan-Arkansas	CO	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Parker-Davis	AZ	1	240	715	715	715
	CA	1	60	256	256	256
	NV	-	-	370	370	370
Subtotal		2	300	1,342	1,342	1,342

Note: Totals may not equal sum of components due to independent rounding.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
Western Area Power Administration

Project	State	No. of Plants	Installed Capacity(MW)	FY 1980 Actual Power(GWH)	FY 1981 Estimated Power(GWH)	FY 1982 Estimated Power(GWH)
Power Marketed (Continued)						
Pick-Sloan Missouri	CA	-	-	260	75	75
Basin Program	CO	6	185	1,168	1,188	1,310
	IA	-	-	1,476	1,555	1,543
	MN	-	-	3,477	3,870	3,810
	MT	3	485	788	807	804
	NB	-	-	2,377	2,491	2,473
	ND	1	430	1,340	1,428	1,415
	SD	4	1,483	1,208	1,210	1,210
	WY	10	218	660	575	613
Subtotal		24	2,801	12,754	13,199	13,253
Provo River	UT	1	5	20	20	20
Subtotal		1	5	20	20	20
Rio Grande	NM	1	24	81	81	81
Subtotal		1	24	81	81	81
Total, Power Marketed		48	8,065	37,349	38,488	38,790
Power Wheeled for Others						
Boulder Canyon	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Central Valley	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Collbran	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Colorado River Basin	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Colorado River Storage	AZ	-	-	3,530	4,080	3,566
	CO	-	-	1,224	636	530
	NV	-	-	7	7	7
	NM	-	-	2	10	10
	UT			500	451	420
Subtotal		-	-	5,263	5,184	4,533

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
Western Area Power Administration

Project	State	No. of Plants	Installed Capacity (MW)	FY 1980 Actual Power (GWH)	FY 1981 Estimated Power (GWH)	FY 1982 Estimated Power (GWH)
Power Wheeled for others (Continued)						
Falcon-Aimstad	-	-	-0-	-0-	-0-	-0-
Subtotal.		-	-	-0-	-0-	-0-
Parker-Davis	AZ	-	-	3,403	3,457	3,457
	NV	-	-	132	132	132
Subtotal.		-	-	3,535	3,589	3,589
Pick-Sloan Missouri	E.D.	-	-	550	550	550
Basin	W.D.	-	-	2,303	2,384	2,467
Subtotal.		-	-	2,853	2,934	3,017
Provo River		-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Rio Grande	-	-	-	-0-	-0-	-0-
Subtotal.		-	-	-0-	-0-	-0-
Pacific Northwest and	AZ	-	-	1,520	1,520	1,520
Southwest Intertie	CA	-	-	312	312	312
	NV	-	-	15	15	15
Subtotal . . .		-	-	1,847	1,847	1,847
Total, Power Wheeled for Others				13,498	13,554	12,986

	FY 1981 Appropriation	FY 1982 Request
Purchase power and wheeling	$61,000,000	$53,200,000

The following table summarizes Western's program of purchase power and wheeling:

	FY 1981	Change ($ in thousands)	FY 1982
Purchase power and wheeling costs financed from appropriated funds (BA)	$61,000	$- 7,800	$53,200
Purchase power and wheeling costs offset by credits from sale of power and from rents for wheeling non-Federal power on Western's transmission lines	15,297	- 4,062	11,235
Total obligations - Purchase power and wheeling	$76,297[1/]	$-11,862	$64,435

[1/] Excludes prior year carry over.

The FY 1982 appropriation request for purchase power and wheeling is $53,200,000, a $7,800,000 decrease from the amount in FY 1981. These funds will allow Western to meet power deliveries under existing contractual commitments and participate in an oil conservation program. In addition, the Purchase Power and Wheeling program provides funds for customer load coordination efforts through energy transfers between river basins by displacing current oil-fired generation. This is an anti-inflation program which seeks, within the limits of water use restraints and transmission limitations, to integrate dispatch of area hydro and thermal generation in the most economic manner to meet total area load obligations. The decrease of $7,800,000 from FY 1981 to FY 1982 primarily reflects reduced energy purchases caused by expiration of the Centralia contract for the Central Valley project in December 1981.

Western's FY 1982 Budget Request includes $3,400,000 for participation in the oil conservation program. Through this program, hydroenergy is used to replace oil-fired generation at peak times. Energy is then returned to Western at offpeak times from coal-fired generating plants. The success of this program relates directly to the amount of water available in a particular river basin and the availability of offpeak coal-fired generation to couple with the hydro system for replacement of oil-fired generation. This positive program of conservation can contribute significantly to the goal of reducing the Nation's consumption of oil. Western expects to engage and expand this activity whenever possible, with continued emphasis on the benefits derived by this conservation program. This program will result in an estimated conservation of an equivalent of 1,700,000 barrels of oil in FY 1982. Revenues realized from these onpeak sales will appreciably exceed the cost of purchased energy.

The following tabulation provides information by utility companies and other electrical entities involved in the purchase power and wheeling program and reflects appropriation amounts and credits from sale of power and rents for wheeling anticipated to be expended in FY 1981 and FY 1982.

PENDING LITIGATION
Western Area Power Administration

City of Anaheim, California, et al. v. Schlesinger. Appeal was filed in the United States Court of Appeals, 9th Circuit, on May 6, 1977, from United States District Court for Arizona, filed February 15, 1974, denying a request for mandamus and for injunctive and declaratory relief against the United States regarding its sale of Navajo Project power and energy to nonpreference customers. The decision of the district court was affirmed December 13, 1978. On May 25, 1979, Plaintiff filed a second discovery request including interrogatories. On August 2, 1979, Defendant filed answer to second discovery request. A Motion for Summary Judgment was granted in favor of the Government. Both parties have filed appellate briefs and are awaiting oral argument before the Ninth Circuit Court of Appeals. The approximate amount claimed by the Plantiff is $1,000,000,000.

City of Santa Clara, California v. Duncan, et al. Suit challenged the Secretary's action of withdrawing temporary commitments of the Central Valley Project (CVP) power and asserted that the CVP power which was "banked" with PG&E was a sale in violation of the preference clause of section 9(c) of the Reclamation Act of 1939, 43 U.S.C. 485(h)(c). The United States District Court upheld the Secretary as to both the allocation decision and the PG&E banking arrangement. The Ninth Circuit Court of Appeals affirmed the Secretary's allocation decision, but reversed as to the banking arrangements and remanded to district court. A settlement agreement has been entered into and has been approved by the court. The Government is no longer subject to a maximum liability of approximately $100,000,000. Two related lawsuits before the Court of Claims, City of Santa Clara V. United States (148-77) and Pacific Gas and Electric Company v. United States (No. 7-79), are anticipated to be be dismissed pursuant to this agreement.

Norman P. Boop v. United States of America. A Federal tort claim for action for damages arising out of the negligent operation of a government vehicle and by a government employee. The claim was denied administratively. Initial pleadings have been filed and discovery has been commenced. The approximate amount claimed by the Plaintiff is $26,000. There was an apparent communication problem between Plaintiff's and Defendant's attorneys: Defendent's attorneys believed that defendant was willing to settle for $500 but Plaintiff claims the amount was $5,000, which is unacceptable to defendant.

United States of America v. Sacramento Municipal Utility District (SMUD). United States seeks a declaratory judgment interpreting the rate adjustment provisions of defendant's power contract with Western. The primary dispute between the parties is whether, under the said contract, SMUD is liable for any portion of future rate increases which is attributable to the importation of power from the Pacific Northwest. The district court granted partial summary judgment in favor of Western on this issue on April 6, 1979. The judgment has been appealed by SMUD. The appeal is awaiting oral argument before the Ninth Circuit Court of Appeals. Maximum liability is approximately $8,500,000 per year through 2004.

United States of America v. State of California, State Water Resources Control Board, et al. United States seeks a declaratory judgment to appropriate water for New Melones Dam and Powerplant from the Stanislaus River to prevent the state from conditioning its water permit. The United States position was upheld by the District Court and the Ninth Circuit Court of Appeals. United States Supreme Court reversed, holding that the State could condition its water permits in a manner not inconsistent with Congressional mandates. The case was remanded to district court, where the matter is still pending. Maximum liability is approximately $14,000,000.

International Brotherhood of Electrical Workers, et al. v. Cecil D. Andrus. Suit filed in equity to compel negotiations between the IBEW union and the Department of Interior and Western over the Presidential "pay cap" limitations. On January 4, 1979, the President issued a memorandum concerning "Federal Pay and Anti-Inflation Program" to limit maximum pay increase to not more than 5.5% for all agency employees during fiscal year 1979. For the period covered by fiscal year 1980, a memorandum was issued by the Office of Personnel Management dated October 3, 1979 directing the heads of executive departments and agencies to limit wage increases for Federal employees to 7.02%. The plaintiffs allege that a pay cap does not apply to them since their wage rates are arrived at through collective bargaining. The Government has filed a motion for Summary Judgment and is awaiting oral argument. The liability exposure is indeterminable. If the plaintiffs prevail, they will be awarded back pay based on negotiated pay increases. Liability is in the range of $25,000 to $30,000.

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AN EELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1981 Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required	Fiscal Gross Billing Purchase Power & Wheeling	Cr	1982 due et ing	Appropriation Required
Sacramento Area							
Pacific Gas and Electric, and Others	$10,383	$-4,585	$ 5,798	$ 26,388		-	$ 26,388
Centralia Thermal Project	46,962	--	46,962	13,642		-	13,642
Billings Area							
Basin Electric Power Cooperative	900	-900	--	900		0	--
Black Hills Power and Light Co. .	606	-224	382	699		9	460
Central Iowa Power Cooperative . .	82	-82	--	90		0	--
Corn Belt Power Cooperative . .	114	-114	--	125		5	--
Dairyland Power Cooperative . .	879	-375	504	1,004		2	612

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1981 Gross Billing Purchase Power & Wheeling	Fiscal Year 1981 Credit due to Net Billing	Fiscal Year 1981 Appropriation Required	Fiscal Year 1982 Gross Billing Purchase Power & Wheeling	Fiscal Year 1982 Credit due to Net Billing	Fiscal Year 1982 Appropriation Required
Billings Area (Continued)						
East River Electric Power Coop., Inc.	324	-324	—	341	-341	—
Interstate Power Company	167	-115	52	197	-119	78
Iowa Electric Light and Power Co.	895	-406	489	1,021	-426	595
Iowa Power and Light Co.	213	-213	—	251	-222	29
Iowa Public Service Co.	167	-115	52	197	-119	78
L & O Power Cooperative	26	-26	—	36	-36	—
Minnesota Power and Light Co.	64	-30	34	72	-34	38
Minkota Power Coop., Inc.	519	-519	—	556	-556	—
Montana Dakota Utilities Co.	758	-592	166	860	-622	238
Montana Power Company	2,577	-903	1,674	2,939	-946	1,993

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AN IEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1981 Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required	Fiscal : 1982 Gross Billing Purchase Power & Wheeling	lit due) Net Lling	Appropriation Required
Billings Area (Continued)						
Nebraska Public Power District	1,956	-1,875	81	2,222	-1,969	253
Northern States Power Co.	3,530	-1,762	1,768	3,978	-1,849	2,129
Northwest Iowa Power Cooperative	552	-552	--	590	-590	--
Northwestern Public Service Company	334	-159	175	376	-170	206
Pacific Power and Light Company	--	--	--	--	--	--
Omaha Public Power District	1,015	-797	218	1,165	-835	330
Ottertail Power Company	42	--17	25	54	-17	37
Southwestern Power Administration	700	--	700	1,000	--	1,000
United Power Association	1,000	-540	460	1,147	-563	584

Department of Energy
Western Area Power Administration
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1981 Gross Billing Purchase Power & Wheeling	Fiscal Year 1981 Credit due to Net Billing	Fiscal Year 1981 Appropriation Required	Fiscal Year 1982 Gross Billing Purchase Power & Wheeling	Fiscal Year 1982 Credit due to Net Billing	Fiscal Year 1982 Appropriation Required
Loveland-Ft. Collins						
Nebraska Public Power District	9	-9	--	10	-10	--
Pacific Power and Light Company	42	-42	--	43	-43	--
Public Service Co. of CO	156	--	156	158	--	158
Tri-State G&T Assn., Inc.	471	-21	450	2,022	-22	2,000
Washakie Rural Electric Assn.	1	--	1	1	--	1
Wheatland Rural Electric Assn.	1	--	1	1	--	1
Basin Electric Power Coop.	750	--	750	2,000	--	2,000
Platte River Power Auth.	102	--	102	350	--	350
GRAND TOTAL	$76,297	$-15,297	$61,000	$64,435	$-11,235	$53,200

Department of Energy

Proposed Appropriation Language

Colorado River Basins Power Marketing Fund,
Western Area Power Administration

[For carrying out the functions authorized by title III, section 302(a)(1)(E) of the Act of August 4, 1977 (Public Law 95-91), for the Upper Colorado River Storage Project, as authorized by the Act of April 11, 1956, as amended (43 U.S.C. 620d), $3,548,000 to remain

Explanation of Changes

Language is deleted because the construction activity for the Upper Colorado River Storage Project has been combined with other Western construction activities under the "Construction, Rehabilitation, Operation and Maintenance" account.

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Colorado River Basins Power Marketing Fund
Western Area Power Administration
(In thousands of dollars)

	FY 1981	FY 1982
Appropriation	$ 3,548	$ ...
Proposed Supplementals	80	...
Subtotal, Budget Authority	3,628	...
Receipts and Reimbursements:		
Unobligated Balance, Start of Year	18,883	500
Unobligated Balance, End of Year	- 500	- 500
Power Revenue	89,452	96,000
Capital Transfer to General Fund	-31,492	-2,600
Total, Obligations	$79,971	$93,400

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
WESTERN AREA POWER ADMINISTRATION - COLORADO RIVER BASIN
(In thousands of dollars)

	FY 1980 Actual		FY 1981 Estimate		FY 1982 Request	
	BA	BO	BA	BO	BA	BO
Western Area Power Administration - Colorado River Basin.....	5,152	-29,976	3,548	-9,561	---	-2,600
Proposed Supplemental...	---	---	80	77	---	3
Total, Western Area Power Administration-Colorado River Basin	5,152	-22,976	3,628	-9,484	---	-2,597

PROGRAM OVERVIEW
Colorado River Basins Power Marketing Fund
Western Area Power Administration

The Colorado River Basins Power Marketing Fund of the Western Area Power Administration (Western) encompasses the power marketing and transmission functions associated with the Upper Colorado River Storage Project, the Fort Peck Project and the Colorado River Basin Project including the United States entitlement from the Navajo coal-fired plant near Page, Arizona.

Western's goals associated within this fund are: to continue to operate and maintain over 3,000 miles of transmission lines, substations and switchyards in a high degree of reliability so that interruptions of service to over 100 power customers are infrequent; to market existing and potential Federal power resources offering electric resources at rates consistent with sound business practices that will enable meeting repayment responsibilities; and to continue to incorporate environmental concerns in planning and operation and maintenance activities.

Operation, maintenance and power marketing expenses are financed from revenues collected by the Department of Energy. Power sales and other revenues collected in excess of expenses are used to pay interest and for repayment of investments. Appropriations are required for transmission system construction on the Upper Colorado River Storage Project (UCRSP). Revenues may not be used to finance construction activities for this project. Beginning in fiscal year 1982, funds for UCRSP construction activities are included under Western's Construction, Rehabilitation, Operation and Maintenance Fund.

In fiscal year 1980, estimated energy marketed by Western under this fund total 11.1 million megawatt hours and resulted in about $145,232,000 of power sales revenues. In FY 1981 and FY 1982, revenues are estimated at $156,276,000 and $171,395,000, respectively. Total power sales revenues for the period FY 1983 through FY 1986 are estimated at $631,419,000. These estimates exclude Fort Peck Project energy sales and revenues which are integrated with the Pick-Sloan Missouri Basin Project and are included in the program overview for the Construction, Rehabilitation, Operation and Maintenance Fund. Additionally, an active fuel conservation program will continue by supplying hydropower during peak load periods, replacing combustion generation. Estimated savings of an equivalent of two to four million barrels of oil are forecast annually.

The increase of $18,948,000 in obligational authority for Western's Revolving Fund projects financed from revenues is due to increased requirements for firm energy purchases and increased participation in the fuel conservation program and the need for additional system replacements and additions. The fuel conservation program is expected to increase income 125 percent over expenses as well as conserve oil and gas-fired generation. Approximately 2,300,000 barrels of oil are anticipated to be saved during FY 1982.

Activities associated with reconstruction of the Fort Peck-Havre 161-kV transmission line will continue in FY 1982. The transmission line presently crosses the Ft. Belnap Indian Reservation. Even though a relocation of the line is anticipated, a portion of the line will still cross the reservation.

In addition, replacement work on a supervisory control and automatic data acquisition system at Western's Montrose, Colorado District Office will continue. Western will also replace obsolete communication and control equipment, specialized high-cost equipment (such as a boom truck) and equipment which contains polychlorinated biphenyls.

In future years, Western will continue work within this fund on essential operation and maintenance of the transmission system to optimize the use of existing Federal resources to maximize benefits and conserve nonrenewable resources. Cooperative work will also be continued with non-Federal entities on transmission facilities.

Colorado River Basins Power Marketing Fund
Western Area Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Power Marketing - Colorado River Basins Power Marketing Fund (Western)				
Operation and Maintenance:				
Operating expenses - obligations	$ 41,380	$ 74,452	$ 74,377	$ 93,400
Subtotal	$ 41,380	$ 74,452	$ 74,377	$ 93,400
Offsetting collections: Applied power revenues used to offset operation and maintenance expenses	$-41,380	$-74,452	$-74,377	$-93,400
Construction:				
Operating expenses	$ 5,152	$ 3,548*	...	...
Subtotal	$ 5,152	$ 3,548	...	...
Total, Operating Expenses	$ 5,152	$ 3,548	...	...

Authorization: Sec. 302(a)(1)(E), P.L. 95-91 and various project authorizations.

Summary of Changes

FY 1981 appropriation enacted	$ 3,548
Program increases and decreases	
FY 1982 budget authority for Upper Colorado River Storage Project construction is requested under the Construction, Rehabilitation, Operation and Maintenance fund in order to consolidate all constuction activities under one account and to improve the financial management process	$ -3,548

*Excludes a pending supplemental request of $80,000.

	FY 1981 Appropriation	FY 1982 Request
Operation and Maintenance	$74,452,000	$93,400,000

The FY 1982 obligation program for operations and maintenance financed from power revenues is $93,400,000, an increase of $18,948,000 over FY 1981. The increase provides for full participation in the fuel replacement program and additional replacements and additions items. Participation in this program in the Upper Colorado River Storage Project should result in substantial savings in oil or gas and accrual of additional revenues which more than offset the cost of purchased energy. Additionally, Western will continue reconstruction activities on the Fort Peck-Havre 161-kV transmission line. The following tabulation compares the FY 1981 appropriation to the FY 1982 request by major categories:

	FY 1981 Appropriation (obs.)	Change ($ in thousands)	FY 1982 Request (obs.)
Transmission System:			
Operation & Maintenance of Transmission Lines	$ 1,092	$+ 205	$ 1,297
Operation & Maintenance of Substations	1,511	+ 914	2,425
Operation & Maintenance of Communications Systems	457	+ 127	584
Subtotal - Transmission System	$ 3,060	$+1,246	$ 4,306
System Operation:			
Dispatching	$ 883	$+ 245	$ 1,128
Power Marketing	350	+ 31	381
Power Billing & Collecting	361	43	404
Subtotal - System Operation	$ 1,594	+ 319	1,913
Ft. Peck Powerplant Generation Expense	2,365	+ 95	2,460
Purchase Power & Wheeling	$53,930	$+7,390	$61,320
Energy Conservation & Renewable Resources Program	20	+ 36	56
Administrative & General Expense	5,946	+1,701	7,647
Interest	4,500	...	4,500
Replacements & Additions	3,037	+8,161	11,198
Total - Operation & Maintenance (OBS)	$74,452	$+18,948	$93,400

Transmission System: FY 1982 Budget Request. $4,306,000

This activity includes the operation and maintenance of approximately 3,000 miles of transmission lines, substations and the communication control system. While there is no increase in the quantity of transmission lines or substations, there have been additions to existing substations which will be completed and require operation and maintenance in FY 1982. The FY 1982 Budget Request provides for 17 additional full-time permanent positions. Of these positions, six are required to maintain Colorado River Storage Project facilities in the Fort-Collins-Loveland Area, which were previously maintained on an "as needed" basis. These facilities require preventive and corrective maintenance to maintain them in a high state of reliability. The remaining 11 positions are required to maintain substation additions and control facilities. The FY 1982 Budget Request also provides for $282,000 for roof repairs at the Montrose District Office.

The operation and maintenance of the transmission system consists of performing duties necessary to protect equipment and provide electric service to customers. Substations contain circuit breakers, switches, customer feeder terminals, transformers to change voltage levels, equipment to regulate voltages, relays for automatic protection, meters and associated electrical equipment. Operation and maintenance duties performed in substations consist of switching to deenergize lines and equipment during emergencies and for maintenance of the electrical equipment. Transmission line maintenance includes ground or aerial line patrols for inspection purposes. Also included is the maintenance of all transmission lines, consisting of maintenance of structures, insulators, conductors, overhead ground wires, access road maintenance, right-of-way maintenance and weed control. The communication system consists of maintaining microwave equipment, radios, power line carriers, telemetering and other power system control equipment.

System Operation: FY 1982 Budget Request. $1,913,000

This activity includes power system control and dispatching, power marketing and power billing and collection activites. The FY 1982 Budget Request provides for three additional full-time permanent positions which are required to perform the system operations functions related to the substation additions which are scheduled for completion in FY 1982 and will be in an operation and maintenance status.

Power system control activities include the central control of the electric operation of the Federal transmission system, including load, frequency and voltage control of Federal generating plants; the operation of the central control and data acquisition computers at Western's power system control centers; the modification and maintenance of the operations related computers, computer terminal equipment and computer programs; dispatching of power over the Federal transmission system; and coordinating the operation of the power system with other interconnected power systems.

Ft. Peck Powerplant Generation Expense: FY 1982 Budget Request. .$2,460,000

This activity funds the expenses of the Corps of Engineers for the generation of power at the Fort Peck Powerplant.

Purchase Power and Wheeling: FY 1982 Budget Request. $61,320,000

The FY 1982 request provides $25,150,000 for purchase energy requirements to meet contractual commitments; $32,620,000 for participation in the fuel replacement program; and $3,550,000 for wheeling expenses. The fuel conservation program under this activity is expected to increase income 125 percent over expenses, as well as conserve oil and gas-fired generation. Approximately 2,300,000 barrels of oil are anticipated to be saved during the fiscal year.

Energy Conservation and Renewable Resources Program: FY 1982 Budget Request. $56,000

The FY 1982 Budget Request provides for full-time permanent positions and contract services to conduct studies directed toward energy conservation and renewable resource development activity. In FY 1982, Western will expand participation in a shall-scale cogeneration project through preference customers. One or more "retail-level" conservation pilot programs (e.g. residential conservation, solar water heating) will be evaluated and implemented through a small number of preference customer utilities to promote area load reduction and stimulate the development of small-scale energy technologies. In addition, Western will purchase and install renewable energy generation equipment at selected locations to provide technical verification of specific site capabilities for future renewable resources development.

Administrative and General Expense: FY 1982 Budget Request. . . $7,647,000

This activity includes executive management, direction of power management functional activities related to power supply and scheduling, power resources and requirements, general system studies, customer service policy development, environmental analysis coordination, and public involvement activities. It also includes administrative support services consisting of programs, finance, personnel, equal employment opportunity, safety, procurement, supply and office services, audit functions, computer support, legal counseling and the expenses associated with these activities for the Western Headquarters, Area Offices and field activities.

Interest: FY 1982 Budget Request. $4,500,000

The FY 1982 Budget Request provides $4,500,000 for interest accruing on the facilities of the Upper Colorado River Storage Project.

Replacements and Additions: FY 1982 Budget Request. $11,198,000

Replacements and additions are units of property which are required for system operations and reliability. The replacements and additions which are provided for in the FY 1982 Budget Request are categorized as follows:

Transmission line rehabilitation: FY 1982 Budget Request . . .($2,700,000)
Reconstruction and realignment of the Fort Peck-Havre 161-kV transmission line which serves as a link between the Fort Peck Powerplant and Western transmission systems in Montana will be initiated. The 188-mile-long line was first energized in 1935 to serve construction power requirements at Fort Peck Dam. The line has no overhead ground wire, making it extremely vulnerable to lightning strikes and has pole shell rot. The environmental impact statement will be completed, acquisition of field data will be completed, preparation of designs and specifications and acquisition of right-of-way will be initiated. Construction is scheduled for FY 1983.

Substation equipment: FY 1982 Budget Request. . . . . ($2,130,000)
Included in the FY 1982 Budget Request is $600,000 for the replacement of an oil circuit breaker for O'Fallon Substation and $1,160,000 for the polychlorinated biphenyl replacement program. The remainder is for various electrical equipment which requires replacement.

Mobile equipment: FY 1982 Budget Request. . . . . ($500,000)
The FY 1982 program provides for one insulated boom truck, eight trucks, one tanker trailer, one backhoe and one tilt-deck trailer.

Communication and control equipment: FY 1982 Budget Request. .($5,646,000)
The program provides $2,800,000 for the acquisition of a supervisory control and automatic data acquisition system which will replace an obsolete and inadequate system installed in the Montrose, Colorado, District Office in 1962. It also provides for $1,800,000 for microwave equipment. The remaining amount is for replacements of telemetering equipment, trip-tone equipment, chart recorders and other miscellaneous communication equipment.

Maintenance facilities: FY 1982 Budget Request . . . . . ($84,000)
The program provides for a vehicle and parts building in the Fort Peck, Montana area.

Tools and work equipment: FY 1982 Budget Request. . . . . ($138,000)
The FY 1982 program provides for the replacement of test equipment, tools, shop and garage equipment and other tools and equipment.

Department of Energy

Proposed Appropriation Language

Emergency Fund, Western Area Power Administration

For the "Emergency Fund", as authorized by the Act of June 26, 1948 (43 U.S.C. 502), to remain available until expended for the purposes specified in that Act, [$200,000] $500,000 to be derived from the Department of the Interior Reclamation Fund (Energy and Water Development Appropriation Act, 1981).

Department of Energy
FY 1982 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Emergency Fund - Western Area Power Administration
(In thousands of dollars)

	FY 1981	FY 1982
Appropriation	$200	$500
Subtotal, Budget Authority	200	500
Receipts and Reimbursements		
Unobligated Balance, Start of Year	234	...
Unobligated Balance, End of Year	...	...
Total, Obligations	$434	$500

PROGRAM OVERVIEW

Emergency Fund - Western Area Power Administration

The Emergency Fund for the Western Area Power Administration as authorized by the Act of June 26, 1948, (43 U.S.C. 502), is for purposes of defraying expenses incurred because of unusual or emergency conditions such as damage to transmission lines, or other physical failures or damage, acts of God or of the public enemy, fires, floods, drought, strikes or freight embargoes, or conditions causing or threatening to cause interruption in operation of power systems. This fund is necessary to insure continuity of power service. Appropriations are to remain available until expended for the purposes specified in the Act.

Emergency Fund - Western Area Power Administration - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1980 Appropriation	FY 1981 Appropriation	FY 1982 Base	FY 1982 Request
Emergency Fund (Western)				
Operating expenses	$200	$200	$200	$500
Total	$200	$200	$200	$500

Authorization: Sec. 1, P.L. 790

Summary of Changes

FY 1981 Appropriation enacted.....	$200
Built-in increases and decreases:	
No change.....	0
FY 1982 Base.....	$200
Program increases and decreases:	
Increase to cover emergency expenses.....	$300
FY 1982 Budget Request.....	$500

The Emergency Fund for Western as authorized by the Act of June 26, 1948, (43 U.S.C. 502), is for purposes of defraying expenses incurred because of unusual or emergency conditions such as damage to transmission lines or other physical failures or damages, acts of God or of the public enemy, fires, floods, drought, strikes or freight embargoes, or conditions causing or threatening to cause interruption in operation of power systems. Appropriations are to remain available until expended for the purposes specified in the Act.

The FY 1982 request of $500,000 is required to defray emergency expenses and is necessary to ensure continuity of electric service and continuous operation of power facilities in event of a major emergency.

DOE/CR-0011/3
SUPPLEMENT

FY 1981

Revised Request to the Congress for Supplementals Rescissions Deferrals

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FEBRUARY 1981
U.S. DEPARTMENT OF ENERGY
OFFICE OF THE CONTROLLER
WASHINGTON, D.C. 20585

NOTE: Only those pages from the DOE FY 1981 Revised Request to the Congress for Supplementals, Rescissions, and Deferrals pertaining to Conservation and Renewable Energy programs have been included herein.

Department of Energy
FY 1981 SUPPLEMENTALS, RECISSIONS, AND DEFERRALS

TABLE OF CONTENTS

Department of Energy
FY 1981 Request for Rescission
Energy Supply R&D - Operating Expenses and Plant & Capital Equipment
(Dollars in Thousands)

Solar Subprogram	Presently Available	Revised Request	Proposed Rescissions
1. Active			
Operating	$ 42,450	$ 40,150	$ -2,300
Capital Equipment	1,250	1,250	0
TOTAL	43,700	41,400	-2,300
2. Passive & Hybrid			
Operating	32,900	31,400	-1,500
Capital Equipment	500	500	0
TOTAL	33,400	31,900	-1,500
3. Photovoltaic			
Operating	153,200	132,200	-21,000
Capital Equipment	7,000	7,000	0
TOTAL	160,200	139,200	-21,000
4. Solar Thermal			
Operating	105,650	87,600	-18,050
Capital Equipment	4,250	4,250	0
Construction	31,850*	31,850*	0
TOTAL	141,750	123,700	-18,050
5. Biomass			
Operating	45,750	30,900	-14,850
Capital Equipment	750	300	- 450
TOTAL	46,500	31,200	-15,300
6. Wind			
Operating	83,700	58,100	-25,600
Captial Equipment	2,100	1,600	- 500
TOTAL	85,800	59,700	-26,100
7. Ocean			
Operating	38,300	33,900	- 4,400
Capital Equipment	700	700	0
TOTAL	$ 39,000	$ 34,600	$- 4,400

*Includes $8,000 for Barstow project deferred from FY80

Subprogram	Presently Available	Revised Request	Proposed Rescissions
8. International			
Operating	$ 12,000	$ 10,800	$ -1,200
9. Information			
Operating	1,400	1,400	0
10. SERI			
Construction	5,000	5,000	0
11. Program Direction	6,786	6,788	0
Total Operating	522,136	433,238	-88,898
Total Capital Equipment	16,550	15,600	- 950
Total Construction	36,850	36,850	0
Total Solar ESR&D	$575,536	$485,688	$-89,848
Congressional Reduction	(20,200)	(20,200)	0
Total Direct Solar	$555,336	$465,488	$-89,848
Alcohol Fuels			
Operating	20,800	18,000	- 2,800
Construction	2,500	0	- 2,500
TOTAL	23,300	18,000	- 5,300
Total Solar	$578,636	$483,488	$-95,148

Justification

Active Solar Heating & Cooling ($2,300)

Increasing energy prices will increase demand for solar hot water and active space heating systems, and higher sales volumes, should provide the necessary capital for the industry to reinvest for required product improvement. Decontrol of oil and continued solar tax credits will accelerate this trend. The Federal role is to continue to support advanced, long-term, high risk R&D related to active solar cooling systems. For these reasons, and in light of the proposed FY 1982 funding level for this program the following is proposed for rescission:

- o Reduction in near term solar hot water and space heating ($2,300)

Passive and Hybrid Solar Energy ($1,500)

The growing public concern with the high cost of energy to heat buildings will create the demand for builders to provide passive solar systems. Residential heating applications are cost competitive; consumer demand is increasing. The Federal role will concentrate on long term R&D for innovative designs and materials for residential cooling and commercial heating and cooling designs and materials. For these reasons and in light of the proposed FY 1982 funding level for this program the following is proposed for rescission:

- o Reduction of residential heating and hot water ($1,500)

Photovoltaic Energy Systems ($21,000)

The Federal role is to support long-term high risk R&D on promising PV technologies that have the potential for providing electrical energy at competitive prices. Industry will provide the financial resources necessary to develop, produce, and market PV systems. Higher energy prices, reflecting decontrol of oil, and continued tax credits will accelerate private sector responses. The industry's response to market forces means the DOE photovoltaics program can reduce its activities focused on near term technology development and commercialization. For these reasons and in light of the proposed FY 1982 funding level for this program the following is proposed for rescission:

- o Reduction of system engineering standards ($2,800)
- o Elimination of market development activities ($11,700)
- o Elimination of several tasks in low cost solar array project ($850)
- o Reduction in planning activities ($5,650)

Solar Thermal Energy Systems ($18,050)

Based upon continued advanced R&D, testing of components and subsystems, as well as supporting conceptual designs, the revised FY 1981 Solar Thermal program will provide industry with the technical base from which they can develop solar thermal products and construct first of a kind, commercial scale plants. A strong commitment by the private sector to develop manufacturing capability and distribution networks can result in significant achievements. There are preliminary indications that these actions are being contemplated by private industry. Rising conventional energy prices, accelerated by decontrol of oil, and continued Federal tax credits for solar energy will provide further stimulus to private industry to undertake nearer term RD&D and commercialization thereby permitting the rescission of these nearer term activities. For these reasons, and in light of the proposed FY 1982 funding level for this program the following is proposed for rescission in operating expense funds:

- Reduction of the Repowering/Industrial Retrofit Program ($3,580)
- Termination of low-temperature, 50,000 sq. ft., evacuated tube collector industrial heat field experiment project ($2,800)
- Initiation of close-down of Mid-Temperature Solar Systems Test Facility for line focus technology ($1,870)
- Reduction of thermal storage technology development ($1,800)
- Reduction of analysis and advanced development activities ($1,680)
- Reduction in support of related activities ($6,320)
  It is anticipated that $3,680 of construction funds will be available by; deferring construction of the Small Community Solar Energy Experiment ($2,680); and projected underrun ($1,000) from Solar One, 10 MW Central Receiver Pilot Plant. When the availability of funds is determined, action will be initiated to reprogram the construction funds to operating funds.

Biomass Energy Systems ($15,300)

The near-term impact of biomass energy comes primarily from the direct combustion of wood and to a lesser extent from on-farm anaerobic digestion gasification and combustion of agricultural wastes. The technical base for these near term activities is nearly complete and the economics are in many cases favorable. There are strong indications that the private sector will continue to increase the use of biomass as a fuel source. Rising conventional energy prices, accelerated by decontrol of oil, and continued Federal tax credits for solar energy will provide further stimulus to private industry to undertake nearer term RD&D and commercialization thereby permitting the rescission of these nearer term activities. For these reasons, and in light of the proposed FY 1982 funding level for this program the following is proposed for rescission:

- Phase out regional wood technical assistance efforts to industry, regional wood assessments and consumer information activities. Eliminate the residential industrial wood programs ($7,250)

- o Eliminate anaerobic digestion demonstrations and information transfer of anaerobic digestion technology. Eliminate assessment of low Btu gasification of crop residues and reduce experiments on developing on-farm methods to produce, process and store vegetable oils as diesel fuel substitute. ($4,750)

- o Terminate research on petrochemical substitutes from electrochemically converted biomass for producing hydrocarbons, olefins and alcohols. Delay research in developing the conversion of lignocellulosic waste materials into phenols, and resins. Cancel integrated aquatics program for the production of fuels from floating seaweeds in southeastern coastal waters and cancel development of oil producing microalgae systems using brackkish water. ($2,850)

- o Reduction of capital equipment required by deferred projects. ($450)

Wind Energy Systems ($26,100)

Deregulation of oil and increasing natural gas prices, coupled with continued wind energy tax credits, are removing subsidies for competing oil and gas technologies that have prevented wind energy from achieving its true potential. Therefore, it is possible to shift the focus of the wind program away from near term technology development and commercialization efforts that can be undertaken by the private sector in response to market forces. There are indications that the private sector is contemplating and initiating actions to develop cost effective wind systems and to invest in factory facilities and marketing networks. For these reasons, and in light of the proposed FY 1982 funding level for this program the following is proposed for rescission:

- o Reduction in near term component and technology research and development activities ($2,500)

- o Reduction in field test experiments ($2,500)

- o Reduction in mission, economic, and market analysis activities; international and outreach programs; and wind characteristics programs ($4,500)

- o Reductions leading to close out of Mod-5 and saved by not initiating Mod-6 wind machine development ($16,600)

Ocean Energy Systems ($4,400)

These reductions are in support of phasing out activities of the ocean energy systems program. The ocean energy systems program is not requesting funding in FY 1982 on the basis that the program is one of high risk with uncertain payoff, and technical feasibility at a small scale has already been demonstrated in a privately-funded operation. This program is proposed to be terminated in FY 1982. It is estimated that the associated termination costs are $2,000,000, consisting of $700,000 as a result of this rescission and an additional $1,300,000 to complete program termination. These costs will be funded from current appropriated funds. For these reasons, the following is proposed for rescission:

- o Reduction of environmental measurements and mission planning activities ($1,400)
- o Reduction of heat exchanger developments ($600)
- o Reduction of cold water pipe experiment support ($1,200)
- o Decrease in biofouling and corrosion support ($1,200)

International ($1,200)

The following is proposed for rescission:

- o A reduction or termination of joint U.S. - Italy, project ($1,200)

The International program is redirecting its efforts in international activities and reemphasizing its traditional role in that technology programs will participate and capitalize on international R&D activities.

Alcohol Fuels ($5,300)

This rescission request reflects the Administration's policy of shifting away from Federal support of near-term R&D and commercialization efforts. Private industry should and can provide needed market development. Therefore the following is proposed for rescission:

- o Reduction in direct support of grant projects and market development activities ($2,800)
- o Termination of Biomass Production Conversion Project ($2,500)

Department of Energy
FY 1981 Request for Rescission
Energy Supply - Research and Development
(Dollars in Thousands)

	FY 1981 Appropriation		Proposed Appropriation		Revised Rescission	
	BA	BO	BA	BO	BA	BO
Geothermal						
Operating Expenses						
Hydrothermal Ind.	49,024	49,856	42,524	48,946	- 6,500	- 910
Geopressured Res.	35,600	37,097	33,061	37,097	- 2,539	0
Geoth. Tech. Dev.						
Hot Dry Rock	13,500	10,425	13,500	10,425	0	0
Component Dev.	35,300	30,246	34,839	30,246	- 461	0
Program Direction	2,376	2,376	2,376	2,376	0	0
Capital Equipment						
Hydrothermal Ind.	0	350	0	350		
Geopressured Res.	200	291	200	291		
Geoth. Tech. Dev.						
Hot Dry Rock	500	1,088	500	1,088		
Component Dev.	610	772	610	772		
Construction						
- Flash Demo--Valles Caldera, NM	10,911	18,655	10,911	18,655	0	
- Binary Demo-- Heber, CA	8,000	7,143	4,000	4,054	- 4,000	-3089
Total Geothermal	156,021	158,299	142,521	154,300	-13,500	-3,999

Justification

This proposed rescission of $13,500,000 reduces hydrothermal industrialization funding for the user coupled programs-a cost shared project to evaluate drilling in low and moderate temperature reservoirs to support non-electric projects-and for feasibility studies for private sector development of non-electric projects ($6,500,000). It also reduces geopressured resource funding by cancelling one geopressured well project. ($2,539,000) And cuts back funds for near-term drilling research and completion technology ($461,000). Finally, the rescission terminates funding for the second demonstration plant at Heber, California employing binary technology ($4,000,000). These reductions are justified because commercial efforts in the private sector are now well developed, along with near-term R&D, and can be supported there. Additionally, reliance should be placed on the private sector for the necessary funding for demonstration plants, therefore, cancellation of the second demonstration plant at Heber, California is appropriate.

Department of Energy
FY 1981 Request for Rescission
Energy Supply - Research and Development
(Dollars in Thousands)

	Presently Available		Revised Appropriation		Proposed Rescission	
	BA	BO	BA	BO	BA	BO
Hydropower						
Operating Expenses						
Hydro Development	11,011	14,714	6,409	14,688	-4,602	-26
Feasibility Study Loans	10,000	7,497	-9,944	4,523	-19,944	-2,974
Program Direction	789	789	789	789	0	
Total	21,800	23,000	-2,746	20,000	-24,546	-3,000

Justification

The small, hydropower industry has experienced a revitilization as evidenced by the tremendous growth of applications at the Federal Energy Regulatory Commission (FERC) for preliminary permits and licenses. Additionally, sufficient incentives are provided through a 21 percent investment tax credit and through credit programs in the Department of Agriculture. As a result, the Administration proposes to rescind $24,546,000 in FY 1981.

This rescission will result in the cancellation of two demonstration construction projects in Nashu, New Hampshire and one cost-shared demonstration project in Columbus, Ohio for small-scale development of hydropower plants ($4,602,000). With the existence of the financial incentives noted above, coupled with the decontrol of crude oil, the Administration now believes there are adequate incentives for the construction and demonstration projects to proceed without additional federal support. The remaining funds proposed for rescission are for Feasibility Study loans which provide for technical assistance to developers for assessing potential projects suitability as small, hydropower plant sites ($19,944,000). Because of the partial de-regulation of licensing procedures as proposed by FERC there will no longer be a need for the feasibility and licensing loan program.

Funds remaining in FY 1981 will provide for an orderly phase out of Federal activities including completion of the 20 cost-shared demonstration projects which will bring 134 MW of power on line by 1985.

PAGES 26 to 30

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Department of Energy
FY 1981 Request for Rescission
Electric Energy - Research and Development
(Dollars in Thousands)

	Presently Available		Revised Appropriation		Proposed Rescission	
	BA	BO	BA	BO	BA	BO
Electric Energy Systems						
Operating Expenses						
Power Delivery	18,500	18,200	16,990	18,027	-1,510	-1,575
Power Supply Ind.	19,000	21,300	16,712	17,500	-2,288	-2,398
Program Direction	923	923	606	923	-317	0
Total Operating Exp.	38,423	40,423	34,308	36,450	-4,115	-3,973
Capital Expenses						
Power Delivery	1,500	1,150	1,500	1,150	0	0
Construction	0	0	- 767	0	-767	0
Total Electric Energy	39,923	41,573	35,041	37,600	-4,882	-3,973

Justification

This proposed rescission ($4,882,000) reduces power delivery funding for: the deep water submarine cable, current program efforts to increase electric power transfer capacity and the improvement of electric energy system efficiency/ reliability ($1,510,000). Additionally, there is a reduction in power supply system's funds for the operation, management and control of electrical energy systems from new sources that may be uncontrolled, dispersed, intermittent and geographically limited ($2,288,000). Funds for the proposed construction of the high-bay addition to the Los Alamos Laboratory in N.M. are no longer required ($767,000). These actions are justified because increased reliance is being placed on the private sector in carrying out near-term research and development and application of developed technologies. Accordingly, the Electric Energy program will now focus on longer-term high-risk but high payoff research that will not nor cannot be done by the private sector.

Department of Energy
FY 1981 Request for Rescissions
Energy Supply Research and Development
(Dollars in Thousands)

Energy Storage Systems	Presently Available	Revised Appropriation	Proposed Rescission
Subprogram			
Operating Expenses			
Electrochemical Storage	$37,800	$26,882	$-10,918
Physical and Chemical Storage	31,300	22,885	- 8,415
Program Direction	1,000	1,000	0
Total Operating Expense	70,100	50,767	-19,333
Capital Equipment			
Electrochemical Storage	700	400	- 300
Physical and Chemical Storage	1,000	700	- 300
Total Capital Equipment	1,700	1,100	- 600
Total Energy Storage	$71,800	$51,867	-$19,933

Justification

The proposed rescission of $19,933,000 reflects a deemphasis in near-term technology development and demonstration efforts that can be undertaken by private industry. Federal spending will be, in general, concentrated upon long-term, high-risk, high-payoff research and technology base development projects where there is little current private sector interest or investment. Projects designed to accelerate development or commercialization of promising near-term electrochemical technologies, for example, will be eliminated or phased out in an orderly manner. Federal involvement is not warranted in light of existing marketplace incentives and private sector ability to exploit proven concepts. Proposed decreases in funding will limit the leverage obtained from industry cost-sharing arrangements, but additional private sector activity is expected to offset leverage losses.

Electrochemical Storage

The change in program emphasis on the solar (photovoltaic, thermal dishes and OTEC), electric vehicles and dispersed battery missions dictates that certain near-term development projects (molten salts, solid electrolyte and flow battery systems) can be terminated.

All planned field test and test bed experiments are terminated because of change in emphasis related to fuel substitution and improved thermodynamic efficiency.

Physical and Chemical Energy Storage

The planned FY 1982 budget eliminates certain activities and a more limited federal role is reflected in the rescission for FY 1981. The long-range outlook for several exploratory efforts is no longer as promising as originally thought and therefore selected projects in the following areas are included in the rescission: development of hydrogen technology, large scale magnetic storage systems, and flywheels for specific applications. Activities are also being eliminated where the private sector will be encouraged to complete development and demonstration work in progress. Demonstrations of seasonal thermal energy storage, underground pumped hydro machinery development, industrial retrofit and electrolyzer development for hydrogen production would be terminated on this basis.

PAGES 34 to 37

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Department of Energy
FY 1981 Request for Rescission
Geothermal Resource Development Fund - Research and Development
(Dollars in Thousands)

Appropriations provided under this heading in the Energy and Water Development Appropriations Act for 1981 (Public Law 96-367) are rescinded in the amount of $22,066,000

	Presently Available		Revised Appropriation		Proposed Rescission	
	BA	BO	BA	BO	BA	BO
Geothermal Resource Development Fund						
Operating Expenses						
Guarantee Reserve Fund	0	0	-21,982	1.253	-21,982	1,253 1/
Loan Evaluation Fund	1,091	1,054	990	1,038	-101	16
Program Direction	193	193	210	209	17	-16
Total	1,284	1,247	-20,782	2,500	-22,066	1,253

Justification

The proposed rescission of $22,066,000 will eliminate a reserve for loan defaults established to help minimize a lender's financial risk so that credit can be made available for the construction and operation of geothermal projects ($21,982,000). It also reduces funding for the loan evaluation fund ($101,000). These actions are justified because the program has developed sufficient interest in the private sector; such that private capital will be available to continue the development of worthy hydrothermal-geothermal resources. This in turn will then allow market forces to properly determine the appropriate allocation of financial resources.

1/ Increase in outlays reflect revised interest differential projections.

PAGES 39 to 62

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Department of Energy
FY 1981 Request for Rescission

Energy Production, Demonstration and Distribution
(Dollars in Thousands)

Appropriations under this heading in the Department of Interior and Related Agencies Appropriations Act, 1981 (Public Law 96-514) and the Supplemental Appropriations Act, 1978 (Public Law 95-240) are rescinded in the amounts of $6,649,000 and $6,000,000, respectively.

	Presently Available		Revised Appropriation		Proposed Rescission	
	B/A	B/O	B/A	B/O	BA	BO
Domestic Energy Supply	11,873	11,584	4,797	10,500	-7,076	- 1,084
Naval Petroleum Reserves	197,974	194,106	198,246	191,034	272	- 3,072
Naval Oil Shale Reserves	3,900	3,800	3,900	3,800	-	-
Federal Leasing	2,775	2,699	2,375	2,300	-400	- 399
Solar	8,540	28,240	3,095	26,147	-5,445	- 2,093
Executive Direction	1,000	1,000	1,000	1,000	-	-
Cost/Outlay Adjustment	-	-3,403	-	-3,403	-	-
TOTAL	$226,062	$238,026	$213,413	$231,378	-12,649	- 6,648

The total rescission for the Energy Production, Demonstration and Distribution Appropriation is $12,649,000. This is composed of reduction to Domestic Energy Supply ($7,076,000; including $6,000,000 from the reserve fund of the coal loan guarantee program); Leasing ($400,000); and Solar Marketing Analysis ($5,445,000). These amounts are offset by an increase for FY 1981 pay-cost requirements to the Naval Petroleum Reserves ($272,000).

Justification

Domestic Energy Supply

Coal

Funding for this program was intended to monitor projects funded under the Alternative Fuels Act and gather and disseminate the information to private industry. Funds in the amount of $427,000 are proposed for rescission. It is planned for this activity to transfer to and become the responsibility of the Synthetic Fuels Corporation. Funds in the amount of $6,000,000 are also proposed for rescission from the Coal Loan Guarantee program which was appropriated in a prior fiscal year. To date, no monies have been expended, thus, they are proposed for rescission.

Oil and Gas

Funding is provided in this program for grants to municipalities, community gas utilities and rural cooperatives to demonstrate the economic and technological viability of unconventional gas resources. Funds in the amount of $921,000 are proposed for rescission because the economics and technology of unconventional gas resources has been successfully demonstrated. Further demonstrations, if necessary, can be adequately provided by the private sector.

Program Direction

Partially offsetting the rescissions mentioned above for Coal and Oil & Gas is an increase of $272,000 for program direction. This is the amount which was previously requested for the payraise supplemental. Even though the program direction activities are being cut back commensurate with the program reductions there is still a need for this addition. The total staff years required in FY 1981 will remain approximately the same as originally requested.

Federal Leasing

Funding for this program is provided for leasing policy development activities including production rate, production goals, alternative bidding systems, work commitment leasing systems, and accelerated onshore oil and gas leasing. Funds in the amount of $400,000 are proposed for rescission. This will terminate initiation of oil shale production goals, oil shale and tar sands alternative bidding systems, onshore oil and gas leasing initiatives and initiation of OCS oil and gas extended leasing systems. It is planned for all leasing activities except the establishment of production rates and goals to be transferred to the Department of Interior.

Solar

The proposed rescission in this program is due to the reduction of its market analysis activities ($5,445,000). The Federal role is to support long-term high-risk R&D that have the potential for providing solar energy at competitive prices. Industry is expected to provide the financial resources necessary to produce and market solar systems.

Department of Energy
FY 1981 Request for Rescission
Energy Production, Demonstration and Distribution
Operating Expenses and Plant & Capital Equipment
(Dollars in Thousands)

Solar Subprogram	Presently Available	Revised Request	Proposed Rescission
1. Federal Buildings	$ 1,800	$ 1,800	$ 0
2. Market Analysis	6,000	555	-5,445
3. Program Direction	740	740	0
Total	$ 8,540*	$ 3,095	$-5,445

*All of these funds are operating expenses. No capital equipment funds are provided.

Justification

Market Analysis

The Federal role is to support long-term high risk R&D that has the potential for providing solar energy at competitive prices. Industry is expected to provide the financial resources necessary to produce and market solar systems. Therefore, the following is proposed for rescission:

- Reduction of market analysis activities ($5,445)

Department of Energy
FY 1981 Request for Rescissions
(Dollars in Thousands)
Funding Summary of Proposed Rescissions

	Presently Available (BA)	Revised Request (BA)	Proposed Rescission (BA)
Buildings and Community Systems			
Subprogram			
Building Systems (BS)	$ 34,325	$ 11,120	$ -23,205
BS	(17,825)	(11,120)	(- 6,705)
Residential/Commercial Retrofit (R/CR)	(16,500)	(-0-)	(-16,500)
Residential Conservation Services (RCS)	14,865	9,210	-5,655
RCS	(5,200)	(3,010)	(-2,190)
R/CR	(9,665)	(6,200) 1/	(-3,465)
Community Systems	13,800	8,608	-5,192
Small Business	750	100	-650
Technology and Consumer Products	20,300	12,670	-7,630
Appliance Standards	6,000	3,742	-2,258
Analysis and Technology Transfer	5,900	3,800	-2,100
Federal Energy Management Program	1,000	530	-470
Urban Waste	10,900	5,790	-5,110
Emergency Temperature Restrictions Program	500 2/	-0-	500
Program Direction	6,430	6,430	-0-
Total	$113,770	$62,000	$-51,770

1/ This line item includes the consolidation of R/CR demonstration and training activities previously identified under Building Systems and Residential Conservation Service.

2/ This negative amount will be applied against existing energy conservation programs in FY 1981.

Justification

Building Systems

Work in support of the Building Energy Performance Standards program is no longer justified in view of the market response to the decontrol of oil prices. In view of the plan to terminate the program in FY 1982, efforts to provide Codes and Standards, program implementation, technical assistance, and a demonstration program will be canceled. The R/CR rescissions under this line item are covered under the Residential/Commercial Retrofit rescission narrative.

This program is being reduced in FY 1981 and, as a result, contract termination and close-out costs of $1,540,000 are anticipated in FY 1981.

Residential Conservation Service

Work in support of the Federal RCS plan and funds for monitoring utility supply, installation and financing activities will not be necessary in view of the market response to oil price decontrol. In view of the plan to terminate the program in FY 1982, new efforts to provide technical assistance to States and utilities on program implementation will be canceled along with plans to evaluate items for addition to the eligible RCS measures.

Specifically the $2,190,000 proposed for rescission will permit the:

- o cancellation of all plans for further technical assistance to States and utilities (continue and complete projects underway such as inspector/ installer training).
- o discontinuation of work to support Federal RCS plan implementation.
- o cancellation of monitoring activities of utility supply, installation and financing activities.
- o cancellation of plans to evaluate new measures proposed for addition to RCS program measures list.

The R/CR rescissions under this line item are covered under the R/CR rescission narrative.

This program is being substantially reduced in FY 1981 and terminated in FY 1982. As a result, contract termination and close-out costs of $350,000 are anticipated in FY 1981.

Residential/Commercial Retrofit 1/

Work in the three program areas--Innovative Demonstrations, Auditor Training and Certification Grants, and the Commercial and Apartment Conservation Service is no longer justified in view of the anticipated impact of the market response to the decontrol of oil prices. Reduced funds for Innovative

---

1/ The activities under this program are included within the Building Systems and Residential Conservation Service programs in FY 1981. The FY 1982 budget reflects a separate line item for R/CR.

Demonstrations will only support a limited-scale demonstration effort in one building sector. In recognition of the more advanced knowledge and planning for the residential sector demonstration, the commercial and multi-family efforts will be eliminated as well as the Residential Energy Efficiency Program. With program termination, there will not be a need for a large number of qualified persons to conduct on-site audits under the program, thus eliminating the need for the Auditor Training and Certification Grants Program. The proposed termination of the Commercial and Apartment Conservation Service program prior to implementation significantly reduces the need for technical assistance support to States and utilities.

Specifically, the $19,965,000 proposed for rescission will permit the:

- cancellation of 24 projects to demonstrate innovative approaches for stimulating conservation investments in commercial (10 projects) and multifamily (10 projects) buildings and in the Residential Energy Efficiency Program (4 projects).

- reduction in the number of innovative residential sector demonstration from 20 to 10.

- cancellation of the Auditor Training and Certification Grants program.

- scale-down of technical assistance for States and utilities in support of the Commercial and Apartment Conservation Service Program.

This program is being substantially reduced in FY 1981 and eliminated in FY 1982. As a result, contract termination and close-out costs of $150,000 are anticipated in FY 1981.

Community Systems

The Community Systems Program consists of two major elements--a technology component and a management component. Within the technology area such systems as district heating and cooling have been pursued. The deregulation of oil provides the proper market signals which will allow for the selection of a district heating alternatives when economically appropriate. Similarly, on the management side, the market signals should be picked up by local governments so that they will initiate management and outreach efforts for energy conservation in public enterprises and in the community as a whole.

Specifically, the $5,192,000 proposed for rescission will:

- discontinue a number of district heating/Integrated Community Energy System demonstration projects.

- reduce a number of Site and Neighborhood Design case projects by working with other Federal agencies to address energy efficiency in community processes.

This program is being substantially reduced in FY 1981 and terminated in FY 1982. As a result, contract termination and close-out costs of $250,000 are anticipated in FY 1981.

Small Business

The Small Business Program has concentrated on providing assistance through the dissemination of practical, efficient and cost-effective advice and information. The Small Business Program has been preparing such information and developing channels of providing the needed assistance. With oil

deregulation, small businesses will look for and select opportunites to improve their energy efficiency when economically appropriate.

Specifically, the $650,000 proposed for rescission will:

- cancel the small business sector guidebooks.
- discontinue the Energy Partnership for American Cities Program, done in conjunction with the Chambers of Commerce across the country.

Technology and Consumer Products

Near-term product development and market development of energy-conserving consumer products have been needed primarily because of the past lack of importance of energy conservation as a criteria in consumer product purchases and the low rate of technologically based innovation in the consumer product industry. With decontrol of oil, market demand for energy-efficient products will increase and manufacturers will respond to this demand. Therefore, a rescission of $7,630,000 is proposed to withdraw Federal support for near-term product development efforts and market development efforts which the industry could undertake on its own.

Specifically, the $7,630,000 proposed for rescission will permit:

- cancellation of all product development work in the areas of space heating and cooling, appliances and lighting.
- cancellation of prototype development efforts for two advanced heat activated heat pumps and two advanced electric heat pumps.
- termination of field testing of advanced gas and oil heating systems and characterization of commercially available systems.
- termination of five development efforts and six planned development efforts for advanced energy-conserving appliances.
- termination of a demonstration phase of the solid state ballast projects and termination of the advanced prototype phase of the Energy Efficient Light Bulb projects.
- cancellation of all market development efforts including Low Cost/No Cost, Fuel Oil Conservation Marketing, and Consumer Products Market Planning.

This program is being substantially reduced in FY 1981 and terminated in FY 1982. As a result, contract termination and close-out costs of $3,000,000 are anticipated in FY 1981.

Appliance Standards

This program is not justified in view of the market response to higher energy prices. Consumers are demanding and manufacturers are producing more energy-efficient products and services without Federal standards, and with oil price decontrol, these trends are expected to continue.

Specifically, the proposed rescission of $2,258,000 will result in:

- cancellation of a Federal Standards and certification/enforcement program.
- termination of all test procedure modifications and revisions.

- o cessation of processing requests for waiver from Federal test procedures
- o termination of Category 14 work.

This program is being substantially reduced in FY 1981 and terminated in FY 1982. As a result, contract termination and close-out costs of $1,000,000 are anticipated in FY 1981.

Analysis and Technology Transfer

Funds approved for this subprogram were intended for planning, analysis and evaluation, for communications and education activites, for economic and impact analysis, and for supporting the interchange of conservation research findings under the International Energy Agency. With rising energy prices, consumers are demanding and producers are providing more energy efficient products and buildings with mandatory standards. The rescission of funds from other programs within the Office of Buildings and Community Systems lessens the need for the analytic services provided by this subprogram. These trends also obviate the need for Federally supported technical assistance and public service information activity.

Specifically, the proposed rescission of $2,100,000 will permit:

- o termination of economic analysis in support of regulatory programs.
- o cancellation of proposed revisions of fact sheets and several "How to" Manuals.
- o cancellation of planned education seminars and technical assistance activities.

This program is being substantially reduced in FY 1981 and terminated in FY 1982. As a result, contract termination and close-out costs of $300,000 are anticipated in FY 1981.

Federal Energy Management Programs

As a result of energy price decontrol and anticipated commensurate price increases in all fuels, Federal agencies now have adequate reason to save energy and dollars without strong DOE guidance or assistance. Therefore the Federal Energy Management Program will reduce its efforts in planning technical guidance, performance evaluation, reporting development of the Federal energy emergency contingency plan, and Federal agency planning and program assistance. The proposed rescission is $470,000.

Urban Waste

Work in support of the Federal Urban Waste program is being reduced. This action is occurring due to the deregulation of domestic petroleum prices and the increasing high price of fossil-based fuels which are making the costs of production of energy from municipal waste competitive with those traditional fuel sources. The proposed rescission is $5,110,000. Therefore, funds for Federal Urban Waste efforts will permit the program to:

- o delete Co-disposal Projects.
- o delay the Wastewater Treatment Program.

- o delete Recycling Projects.
- o delay Thermal Projects.
- o delay Mechanical Programs.
- o reduce Program Support.
- o eliminate Incentives Support.
- o delay Demonstration.
- o eliminate Institutional R&D.

This program is being reduced in FY 1981 and, as a result, contract termination and close-out costs of $420,000 are anticipated in FY 1981.

DEPARTMENT OF ENERGY
FY 1981 REQUEST FOR RESCISSION
ENERGY CONSERVATION
(Dollars in thousands)

	Presently Available	Revised Appropriation	Proposed Rescission
Industrial Energy Conservation			
Operation Expenses and Capital Equipment			
Waste Energy Reduction	$ 24,800	$ 14,800	$-10,000
Industrial Process Efficiency	37,800	14,900	-22,900
Industrial Cogeneration	16,500	8,000	- 8,500
Implementation and Deployment	7,500	2,700	- 4,800
Program Direction	3,100	2,600	- 500
Total Industrial Energy Conservation	$ 89,700	$ 43,000	$-46,700

JUSTIFICATION

The rising cost of energy and increasing demand for energy efficient products has stimulated the private sector to engage in research and development of new energy recovery techniques, industrial process improvement, and industrial cogeneration technologies. Decontrol of oil coupled with continued Federal tax incentives for energy conservation will accelerate this trend. Therefore, it is no longer necessary for the Federal Government to support a variety of individuals, RD&D projects, and information activities aimed at specific end-use products, since this will be undertaken by private industry (audits, institutional research organizations) in response to market forces.

Longer term research on advanced conservation components and subsystems that would not be supported by the private sector will be undertaken by the Energy Conversion and Utilization Technologies program. These research projects are generic in nature and could lead to further private sector developed work in various end-use sectors (including industrial applications).

For these reasons, and in view of the proposal to terminate these program in FY 1982, the following projects are proposed for rescission in FY 1981:

Waste Energy Reduction: Fluidic high temperature sensor, bi-phase concentrator, slagging burner, chemical heat pump, comminution and blasting, conversion of industrial waste to fuel oil, reradiant recuperators, large passage recuperators, district heating/industrial heat source heat exchanger, water-to-water heat pumps, Stirling cycle heat pumps, waste wood lumber dryer and mobile tire pyrolysis systems.

Industrial Process Improvement: Advanced Catalytic Reactor, Continuous Refining of Vegetable Oil, Computer Controls and Sensors for Industrial Processes, an Advanced Pulping Process, Advanced Copper Reduction, Formcoke, Pellet Coke, Petroleum Crude Unit, Efficient Motor Testing, Alternatives to Natural Gas in Paint Curing, Methane Transport Systems, Cutting Tool Coatings, Glass Pellet Preheat, Crop Drying Systems and Integrated Farm Energy Systems. Prior year appropriated funds for form coke which remain unobligated will be redirected to generic research in support of industrial process efficiency and waste energy reduction projects.

Industrial Cogeneration: Advanced Bottoming Cycles, Closed Cycle Gas Turbine Systems, Thermionic Topping Cycles and Externally-Fired Coal Burning Brayton Cycle Systems.

Implementation and Deployment: Boiler training workshops in 40 regions, expansion of the six energy analysis and diagnostic centers to sixteen universities and technology transfer.

The Industrial Energy Conservation program is being substantially reduced in FY 1981 and FY 1982. As a result, contract termination and close-out costs of $ 2,642,000 are anticipated in FY 1981 for Waste Energy Reduction, Industrial Process Improvement, Industrial Cogeneration, and Implementation and Deployment.

Program Direction: Commensurate with the reduction in workload during FY 1981, funds for a total of fifteen staff positions can be rescinded.

Department of Energy
FY 1981 Request for Rescissions
Conservation and Solar Energy
(Dollars in Thousands)

Transportation Programs	Presently Available (BA)	Revised Request (BA)	Proposed Rescission (BA)
Subprograms			
Vehicle Propulsion Technology Development	$ 67,900	$ 41,400	$ - 26,500
Electric and Hybrid Vehicle RDT&E	36,820	27,270	- 9,550
Transportation Systems Utilization	6,700	4,900	- 1,800
Alternative Fuels Utilization	5,300	4,500	- 800
Program Direction	2,930	2,930	0
Total Operating Expenses and Capital Equipment	$119,650	$ 81,000	$ - 38,650

Justification

Vehicle Propulsion Technology Development

Funds in this program were intended to provide research, development and demonstration efforts to advance the development of and accelerate industry acceptance of energy-efficient and socially-acceptable advanced propulsion systems for highway use. Automobiles are becoming more efficient as a result of industry's commitment to provide a competitive, fuel-efficient product in the marketplace. As fuel prices rise, an increased stimulus is present for the major U.S. automakers to continue this trend and incorporate propulsion systems of increasingly advanced design and sophistication. Funds in the amount of $26,500,000 are therefore proposed for rescission to begin a transition from the development of technologies that can be commercially feasible without Federal assistance to research on high-risk, long-term supporting technology. Reductions in the following projects are proposed:

Gas turbine: Third gas turbine team development work with Chrysler/Williams ($7,000,000); component development and material characterization and vehicle integration work with Garrett/Ford ($300,000); vehicle integration and MOD I engine build with DDA/Pontiac ($3,100,000); activity on 2265°F engine ceramic design ($2,600,000); commercialization and market activities ($400,000); and supporting research and technology and project management activities in the field ($1,000,000)

Stirling engine: Stirling engine component development program that duplicates the more generic ECUT program on this technology ($5,000,000); MOD II engine design, reference engine activity, and commercialization activities ($2,203,000); MOD I engine activities ($741,000); and supporting research and technology and project management activities in the field ($1,856,000)

Vehicle systems: Road tests of diesel-organic Rankine compound engines for long-haul trucks, adiabatic diesel activities, and environmental evaluations ($1,037,000); gas turbine bus demonstration ($800,000); turbocompound diesel engine activity, transmission technology, diesel emissions technology and project management activities in the field ($463,000)

Electric and Hybrid Vehicle RDT&E

The private sector is responding to the demand for energy-efficient vehicles with lower operating and maintenance costs to consumers. Included in the effort by the automotive industry to meet this demand is the development and eventual production and marketing of electric vehicles. A rescission of $9,550,000 is proposed to phase out the nearer term research and development activities and demonstration of current state-of-the-art vehicles while continuing advanced research and development of electric and hybrid vehicles technology to improve performance and reduce costs. Reductions in the following projects are proposed: market demonstration project and public awareness activities ($610,000);

addition to loan default fund ($1,100,000); hybrid vehicle battery research and systems development ($1,910,000); advanced vehicle propulsion system development ($545,000); electric vehicle near-term battery research, propulsion and nonpropulsion subsystems development, test vehicle development and field tests ($4,125,000); vehicle evaluation and improvement program with universities ($217,000); technical support effort ($1,043,000).

Transportation Systems Utilization

DOE supported research has identified the benefits and other factors associated with non-Federally supported activities in the areas of medium-speed diesel bottoming cycle technology, aircraft towing, driver feedback devices and certain research and information dissemination activities. Further progress would depend, even with continuing Federal support, on the active commitment by vehicle operators to such efforts. Since past DOE research and feasibility studies, plus rising fuel costs, make these technologies more attractive to the private sector and provide a sufficient basis upon which the affected parties can judge the extent to which they wish to pursue action, a rescission in the amount of $1,800,000 is proposed to withdraw Federal support from the following projects: marine organic bottoming cycle demonstration, area navigation impact on energy conservation study, vehicle performance technical support, and municipal government heavy-duty vehicle manual preparation ($1,155,000); aircraft towing project, driver efficiency teach-ins and analytical support ($400,000); driver feedback device evaluation and driver awareness consumer materials development ($245,000).

Alternative Fuels Utilization

Funds in this program had been requested to initiate tests on the use of vegetable oil as a supplemental fuel for diesel equipment in farming applications and to establish a synthetic fuels supply depot. A rescission in the amount of $425,000 is proposed since work on the physical testing of the vegetable oil has been deferred awaiting the outcome of an assessment on resource availability and an evaluation of compositions from various levels of processing, and the establishment of the synfuels depot has been deferred until specific needs on size and numbers of fuels are determined. In addition, delays in establishing alcohol/blend fuel compositions for use in field reliability fleet tests have resulted in a stretch-out of this project and a further proposed rescission of $375,000.

Department of Energy
FY 1981 Request for Rescission
Energy Conservation - Operating Expenses and Plant & Capital Equipment
(Dollars in Thousands)

	Presently Available (BA)	Revised Request (BA)	Proposed Rescission (BA)
State and Local Assistance Programs:			
Subprogram			
Schools and Hospitals Grants Program.....	$181,250	$ 81,300	$-99,950
Weatherization Assistance Grant Program.....	181,975	175,000	- 6,975
Energy Management Partnership Activities:			
Energy Policy and Conservation Program.....	37,800	37,800	0
Energy Conservation and Production Grant Program..	10,000	10,000	0
Energy Extension Service Program.....	20,000	20,000	0
Emergency Energy Conservation Program.....	12,000	2,000	-10,000
Program Direction.....	9,862	9,862	0
Total Operating Expenses....	$452,887	$335,962	$-116,925

Restraining the growth of Federal spending lies at the center of the President's economic recovery program. In some instances, achieving this goal requires a stretch-out of public sector capital investment programs. Such an approach is being applied to the funding for the Schools and Hospitals Grant Program. Further justification for this approach is as follows.

Justification

Schools and Hospitals Grant Program

The Schools and Hospitals Program was fully implemented six months after enactment of the authorizing legislation. This rapid implementation was necessary in order to meet Congressional mandated time frames. During the first full year of implementation, in excess of $250 million was awarded in grants to eligible institutions. It is now appropriate that the Federal spending rate be slowed to allow time to better evaluate the impacts of the funds obligated to date, to further refine DOE management information systems and to judge the differential impacts of other market forces, such as, decontrol of oil prices. Additionally, many institutions have expressed concern that the rapid implementation had not allowed them time to

fully meet program requirements, such as, complete implementation of recommended low-cost operating and maintenance changes and time to form the capital necessary to meet the program's 50 percent non-Federal matching requirements. Therefore, a rescission in the amount indicated is proposed in FY 1981 to slow the pace of the program and allow time for these necessary activities to be accomplished.

Weatherization Assistance Program

The Department's Weatherization Assistance Program will be incorporated into the Department of Housing and Urban Development's community development block grant program. Low-income home weatherization activities will thus continue, but more in accord with local needs and priorities. Currently, about one-third of community development block grant funds, or about $1 billion annually, is targeted by recipient communities to some form of rehabilitation. Combining the Department of Energy weatherization program with the community development block grant is one example of Administration efforts to shift resources and decisionmaking authority to State and local governments through block grants and program simplification wherever possible. The existing Department of Energy program has been plagued by increasing costs and quality control problems. As currently structured, the Department of Energy program would take 50-100 years to reach all the potentially eligible low-income households in the Nation. By shifting administrative responsibility entirely to the local level, communities will be able to devise weatherization efforts most appropriate to their needs and circumstances and achieve greater levels of efficiency and productivity.

Grant funds in the amount of $175,000,000 had already been committed to the States. The remaining $6,975,000 will be rescinded from the FY 1981 appropriation.

Emergency Energy Conservation Program

In keeping with Administration policy, categorical grants are being de-emphasized in favor of block grants. This rescission reflects that policy by eliminating the State grant component from the Emergency Energy Conservation Program budget. The emergency planning function itself is being reorganized to provide more centralized guidance and it is felt that expenditures in this area should be kept to a minimum until that reorganization takes place and a full assessment of needs and resources can be accomplished. At that time, the status of existing emergency contingency plans will be reviewed to determine whether additional authority is required, and to assure that all interests of consumers are appropriately protected. A number of studies suggest that a market-oriented approach to managing supply disruptions is preferable to government allocation programs and these studies will also be reviewed carefully.

Department of Energy
FY 1981 Request for Rescissions
Conservation and Solar Energy
(Dollars in Thousands)

	Presently Available	Revised Request(BA)	Proposed Rescission(BA)
Energy Impact Assistance	$62,000	$ 10,000	$- 52,000

Justification

The success of the President's Economic Recovery Program requires significant fiscal retrenchment. In order to achieve that objective, funding for lower priority programs must be reduced or eliminated altogether. Under these circumstances, continued funding for this program cannot be justified. Energy resource development yields substantial profits for private developers. It is the responsibility of state and local governments to ensure that they reap sufficient revenues to pay for public services required as a result of energy development activity.

Specifically, the $52,000 proposed for rescission will allow for the discontinuance of approximately 200 grants to local jurisdictions for site acquisition and development.

Department of Energy
FY 1981 Request for Rescission

Alternative Fuels Production
(Dollars in Thousands)

	Presently Available 1/		Revised Appropriation 1/		Proposed Rescission	
	BA	BO	BA	BO	BA	BO
Alternative Fuels Production:						
P.L. 96-126	2,208,000	208,000	2,208,000	208,000		
P.L. 96-304	3,310,000	310,000	3,010,000	10,000	-300,000	-300,000
Total, Alternative Fuels Production	5,518,000	518,000	5,218,000	218,000	-300,000	-300,000

Justification

The Alternative Fuels Production program was established as part of interim measures to support the rapid development of the domestic synfuels industry, pending full activation of the Synthetic Fuels Corporation (SFC). This goal was to be achieved by providing financial incentives including the funding of feasibility studies and cooperative agreements, as well as loan guarantees, price guarantees, and purchase commitments.

Of the total of $5,518,000,000 appropriated for this program, $5,000,000,000 was provided for loan guarantees, price guarantees, and purchase commitments, $18,000,000 was provided for program management costs, and $500,000,000 for feasibility studies and cooperative agreements. Of the funding provided for feasibility studies and cooperative agreements, a total of $300,000,000 is proposed for rescission: $300,000,000 from P.L. 96-304 (which, to date, has not been awarded).

Because this program is essentially aimed at providing subsidies to companies to do design and other studies so that they can then ask the Government for much larger subsidies to build their plants, the Administration is proposing to rescind the funds for additional feasibility studies and cooperative agreements. It is doubtful whether any company which does not have either the technical resources or the relatively small financial resources necessary to do these studies will be able to adequately share risks or provide sound management and technical resources necessary to successfully construct and operate a commercial synfuels facility. In addition, the first round of feasibility studies and cooperative agreements initiated a sufficient number of studies to assure that the SFC will have an adequate number of projects to allocate its resources.

1/ Funds appropriated in FY 1980; to date $200 million has been obligated.

United States
Department of Energy
Washington, D.C. 20585