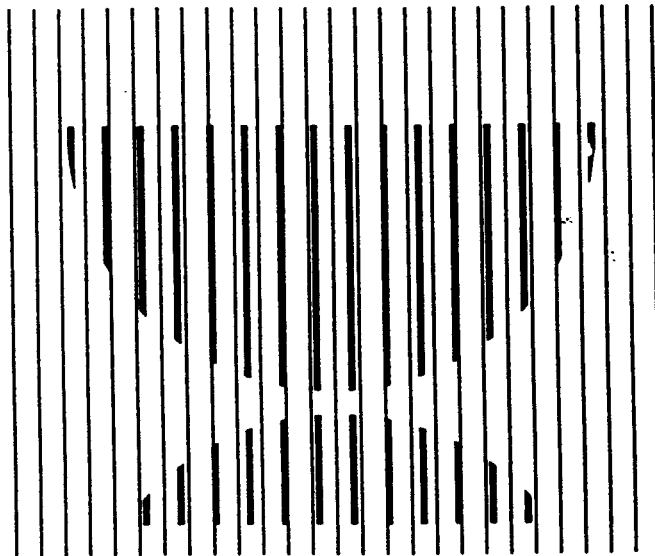


CBO STAFF MEMORANDUM

**THE ENERGY POLICY ACT OF 1992:
A BUDGETARY PERSPECTIVE**

December 1992



**CONGRESSIONAL BUDGET OFFICE
SECOND AND D STREETS, S.W.
WASHINGTON, D.C. 20515**

This Congressional Budget Office (CBO) Staff Memorandum summarizes the estimated budgetary costs of the Energy Policy Act of 1992. The act was passed by the 102nd Congress and signed into law on October 24, 1992. The memorandum focuses on the act's authorizations for spending on a variety of programs conducted by the Department of Energy (DOE), and it compares the authorizations with current and historical spending for such DOE programs.

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INTRODUCTION

After two years of legislative work on a wide-ranging energy bill, the Congress cleared H.R. 776, the Energy Policy Act of 1992, on October 8, 1992. The President signed the bill into law on October 24, 1992, making it Public Law 102-486. The Energy Policy Act is the broadest and most extensive energy legislation enacted since the National Energy Act of 1978. The final product lacks some controversial provisions that made their way into earlier versions of the legislation; in particular, Congress jettisoned provisions that would have allowed exploratory drilling for oil and gas in the Arctic National Wildlife Refuge, mandated higher corporate average fuel economy standards for automobiles, and required the government to buy back certain offshore leases from private companies that plan to drill for oil and gas. The act does, however, contain some significant changes in federal energy policy, most notably a reform of regulations on the U.S. electric utility industry.

The utility industry reform will allow and encourage more competition between established utilities and independent power producers in the wholesale power market. In addition to this major regulatory change, the act contains several changes to the U.S. tax code, including new tax incentives for energy conservation, renewable energy, and alternative-fuel vehicles and tax cuts for independent oil and gas drillers. Another key point of the act's revenue title is

a new health care entitlement for retired coal miners, together with increased taxes to pay for those benefits.

The act converts the government's uranium enrichment enterprise from an annually appropriated program in the Department of Energy (DOE) to a direct spending program in the form of a federally owned corporation. The act requires nuclear utilities to begin making payments to cover part of the costs of cleaning up federal uranium enrichment facilities. In addition, the act streamlines the government's licensing process for new nuclear power plants, and it mandates higher energy-efficiency standards for appliances, plumbing equipment, and buildings.

Aside from regulatory and tax-related provisions, the Energy Policy Act contains numerous authorizations for new or continued spending by DOE, covering a broad range of programs. In this memorandum, the Congressional Budget Office (CBO) tallies those authorizations of appropriations. It organizes them into seven major spending categories and compares them with recent appropriations to give some perspective on the act's spending priorities. The ultimate impact of setting such spending priorities, however, is wholly dependent on future appropriation action, since authorizations by themselves do not constitute any authority to spend federal funds. The next several years' appropriation bills will determine whether and to what degree the act's spending

priorities are followed. Moreover, the act does not fully indicate spending priorities for the long term because its authorizations after 1994 are incomplete. Some programs could continue for several years even though the act specifies authorizations for only one or two years. In fact, many energy programs have received appropriations in the past even when formal authorizations were not enacted. Hence, the act's authorizations may be a guide to future spending, but not a complete or certain one.

SUMMARY OF BUDGETARY COSTS

The Energy Policy Act of 1992 contains authorizations of appropriations for dozens of new and existing energy programs, as well as several provisions that would affect federal revenues or direct spending. (See Box 1 for an explanation of the relationship between authorizations, appropriations, and direct spending in the budget.)

Authorizations of Appropriations

Most of the authorizations in the Energy Policy Act are devoted to continuing current DOE programs. It is the authorizations for new or expanded programs,

Box 1.
Authorizations, Appropriations, and Direct Spending

The Congress can provide funding through the appropriation process or through other legislation that contains its own spending authority. In many cases, Congress will first *authorize* spending for a particular program and then later *appropriate* the funds that were authorized. The Energy Policy Act of 1992 is, for the most part, an authorization bill. Funds authorized in the act will not affect federal spending unless they are actually appropriated. The act also contains some direct spending provisions, which do not require appropriations. The following information delineates the differences between authorizations, appropriations, and direct spending with regard to the Energy Policy Act.

Authorization: A provision of law that authorizes appropriations for a program or an agency. An authorization may be effective for one year, a fixed number of years, or an indefinite period. An authorization may be for a definite amount of money or for "such sums as may be necessary."

The Energy Policy Act contains numerous multiyear authorizations. Most are for specified amounts, but several are of the "such sums" type.

In general, authorizing legislation is viewed as a prerequisite for appropriations. Several energy programs, however, have received appropriations in the past without having enacted authorizations in place. Committees with jurisdiction over energy programs have worked on numerous authorization bills over the last several years, but such legislation has generally fallen short of enactment. The Energy Policy Act is the first wide-ranging authorization of energy programs to be enacted in more than a decade.

Appropriation: A provision of law providing budget authority that permits federal agencies to incur obligations and to make payments out of the Treasury for specified purposes.

Appropriations represent the amounts that agencies may obligate during the period of time specified. Most energy programs are funded through annual appropriations that provide new budget authority that is "available until expended." In contrast, some appropriations are provided for only one year. Appropriations may be set equal to amounts authorized in legislation such as the Energy Policy Act. Alternatively, future appropriations for any given program could provide more or less than the amounts in an authorization act.

Direct Spending: A provision of law that, by itself, results in a change in federal spending--without an accompanying appropriation law.

Direct spending provisions can either increase or decrease federal outlays: for example, the uranium enrichment cleanup fees required by the Energy Policy Act will decrease outlays, and a new entitlement for coal miners will increase outlays.

however, that provide a starting point for assessing how the act may shift federal spending priorities for energy programs by influencing future appropriations and budget requests. The tables, figures, and discussion in this memorandum are intended to help define that starting point. In particular, this memorandum attempts to answer three questions:

- How much spending is authorized?
- Is this funding authorized for new programs or for ongoing efforts?
- How do these authorizations compare with historical funding levels?

Based on amounts specified in the Energy Policy Act and information provided by the Department of Energy, CBO estimates that the act authorizes \$3.2 billion of spending in fiscal year 1993 and a total of \$12.3 billion over the five-year period through fiscal year 1997 (see Table 1). These authorizations cover seven broad categories:

- Alternative-fuel vehicles,
- Renewable energy,
- Energy conservation,
- Nuclear energy,
- Fossil energy,
- Global warming, and
- Basic energy sciences.

TABLE 1. SUMMARY OF AUTHORIZATIONS IN THE ENERGY POLICY ACT
(In millions of dollars, by fiscal year)

Spending Category	1993	1994	1995	1996	1997	1993– 1997
Alternative–Fuel Vehicles	339	331	176	121	131	1,098
Renewable Energy	416	522	200	192	190	1,520
Conservation	277	371	130	310	394	1,482
Nuclear Energy	571	1,623	355	367	379	3,294
Fossil Energy	525	566	399	409	420	2,319
Global Warming	100	150	152	154	100	655
Basic Energy Sciences	970	1,003	2	2	2	1,979
Total	3,199	4,566	1,413	1,554	1,616	12,348
Specified Authorizations	2,907	2,605	597	487	476	7,073
Estimated Authorizations	292	1,961	816	1,067	1,140	5,275
Total	3,199	4,566	1,413	1,554	1,616	12,348

SOURCE: Congressional Budget Office.

Most of the authorizations in the act are for specific amounts; they total just over \$2.9 billion for 1993 and about \$7 billion for the 1993-1997 period. However, the act also authorizes a number of programs for which it does not specify an amount to be appropriated. CBO estimates that implementing these unspecified authorizations would cost about \$300 million for 1993 and about \$5.3 billion for the 1993-1997 period. (See the appendix for a complete list of specified and estimated authorizations in the Energy Policy Act.)

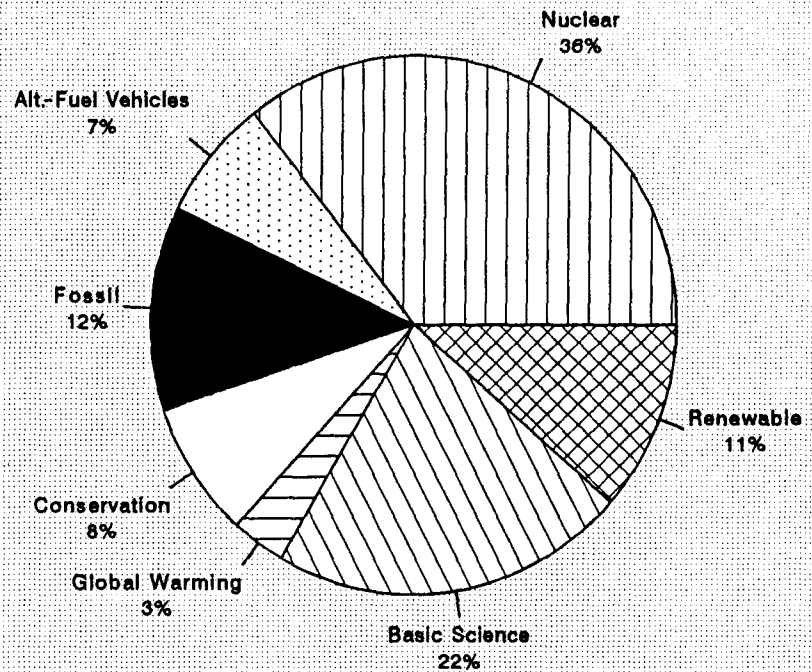
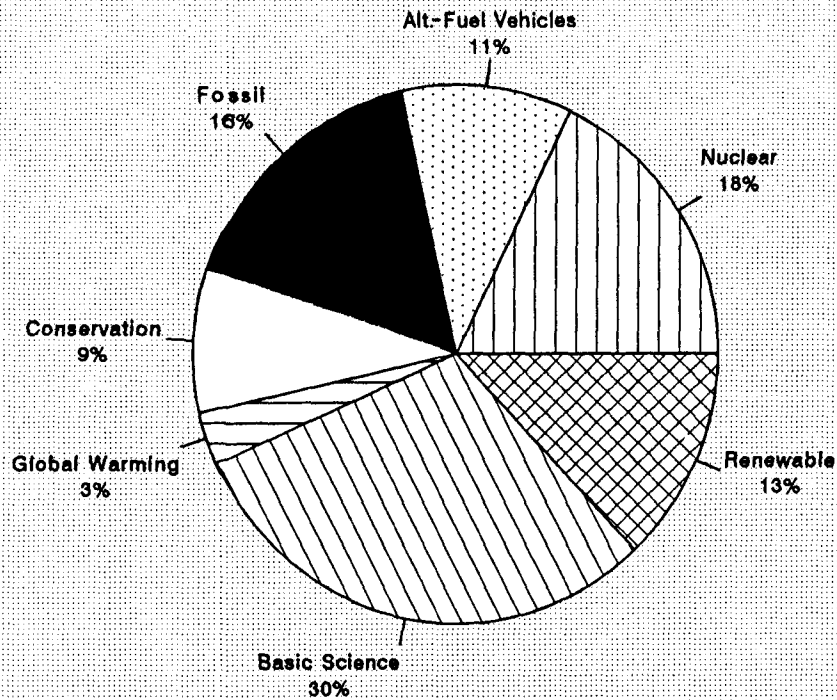
The bulk of DOE's spending on energy research and development (R&D) programs is, and always has been, devoted to basic energy sciences, nuclear energy, and fossil energy. Appropriations for these three areas account for about 60 percent of energy research funding in 1993 and 57 percent over the past 10 years (see Figure 1). The Energy Policy Act's authorizations do not change those overall priorities, but they do indicate a policy goal of increasing the relative importance of the other R&D categories. (Figure 1 does not compare spending categories after 1994 because the act's authorizations do not cover all programs for all years, but Appendix Table A-3 has a complete list of authorizations by category for each year through 1997.)

Figure 1. Composition of Energy Policy Act Authorizations for Fiscal Years 1993 and 1994

1993: \$3.2 Billion

1994: \$4.6 Billion

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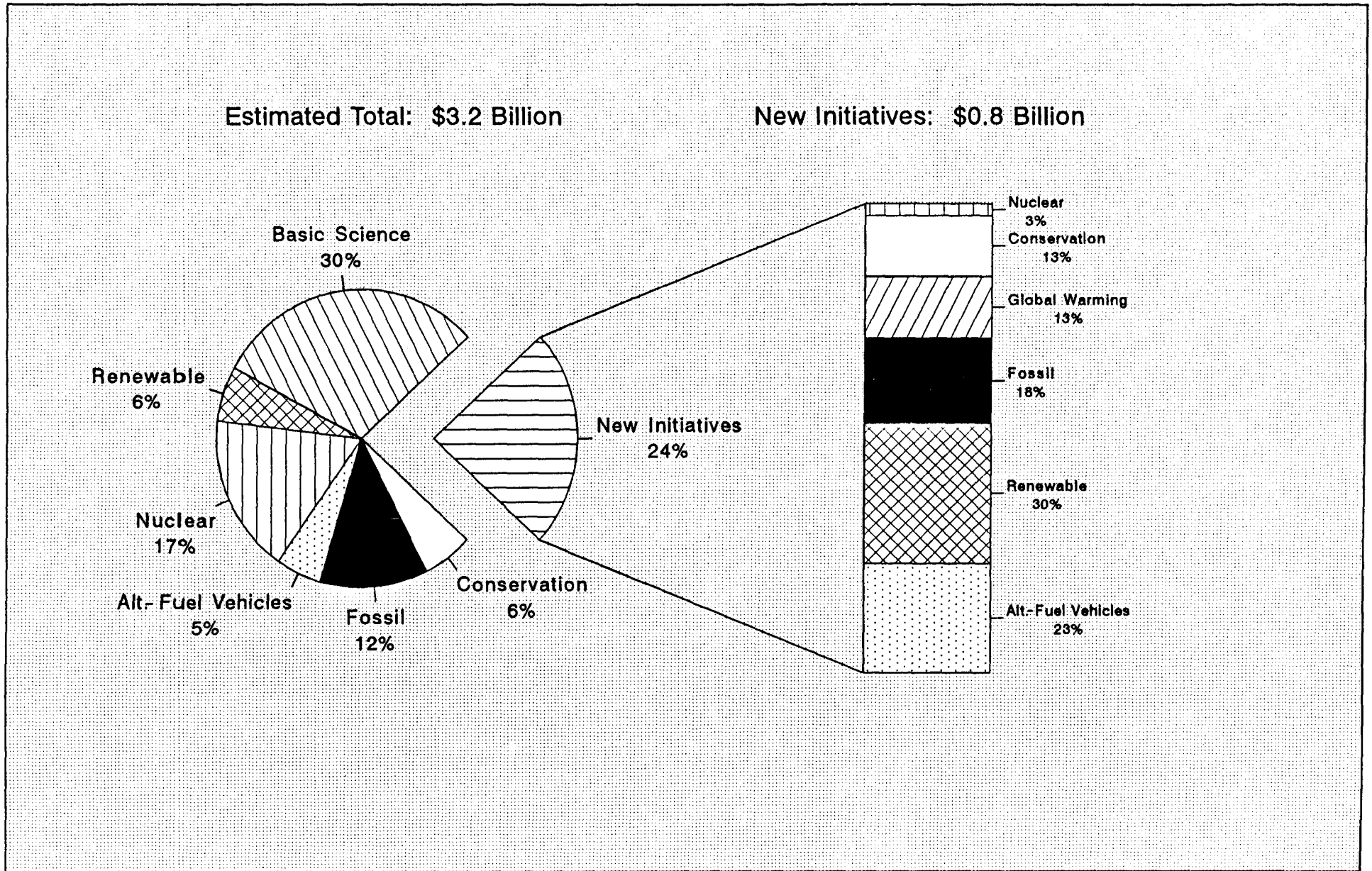
SOURCE: Congressional Budget Office.

New Initiatives Versus Ongoing Programs

In real terms (that is, accounting for inflation), funding for nearly all energy R&D programs shrank during most of the 1980s. Over the last three years, however, appropriations have reversed that trend for renewable energy and conservation R&D. The Energy Policy Act would further boost spending for renewable energy, as well as spending on other nontraditional technologies such as alternative-fuel vehicles. In 1993, the act authorizes \$600 million of new initiatives in the areas of alternative-fuel vehicles, renewable energy, conservation, and global warming, but only \$160 million of new initiatives for nuclear energy, fossil energy, and basic energy sciences. (New initiative refers to any significant increase in the program activities covered by authorizations for a spending category, as well as to any totally new program.)

Of the \$3.2 billion authorized for 1993 by the Energy Policy Act, approximately three-quarters is aimed at continuing current DOE programs at roughly the same level as in 1992, with an emphasis on spending for research in basic energy sciences, nuclear energy, and fossil energy (see Figure 2). The remaining one-quarter, about \$800 million, is earmarked for new programs and expanded program efforts. So far, these new activities have not been funded at the act's full authorization levels for 1993. The unfunded authorizations, detailed in the bar chart on the right-hand side of Figure 2, include efforts in

Figure 2. Energy Policy Act Authorizations for Fiscal Year 1993:
Continuing Programs by Category vs. New Initiatives



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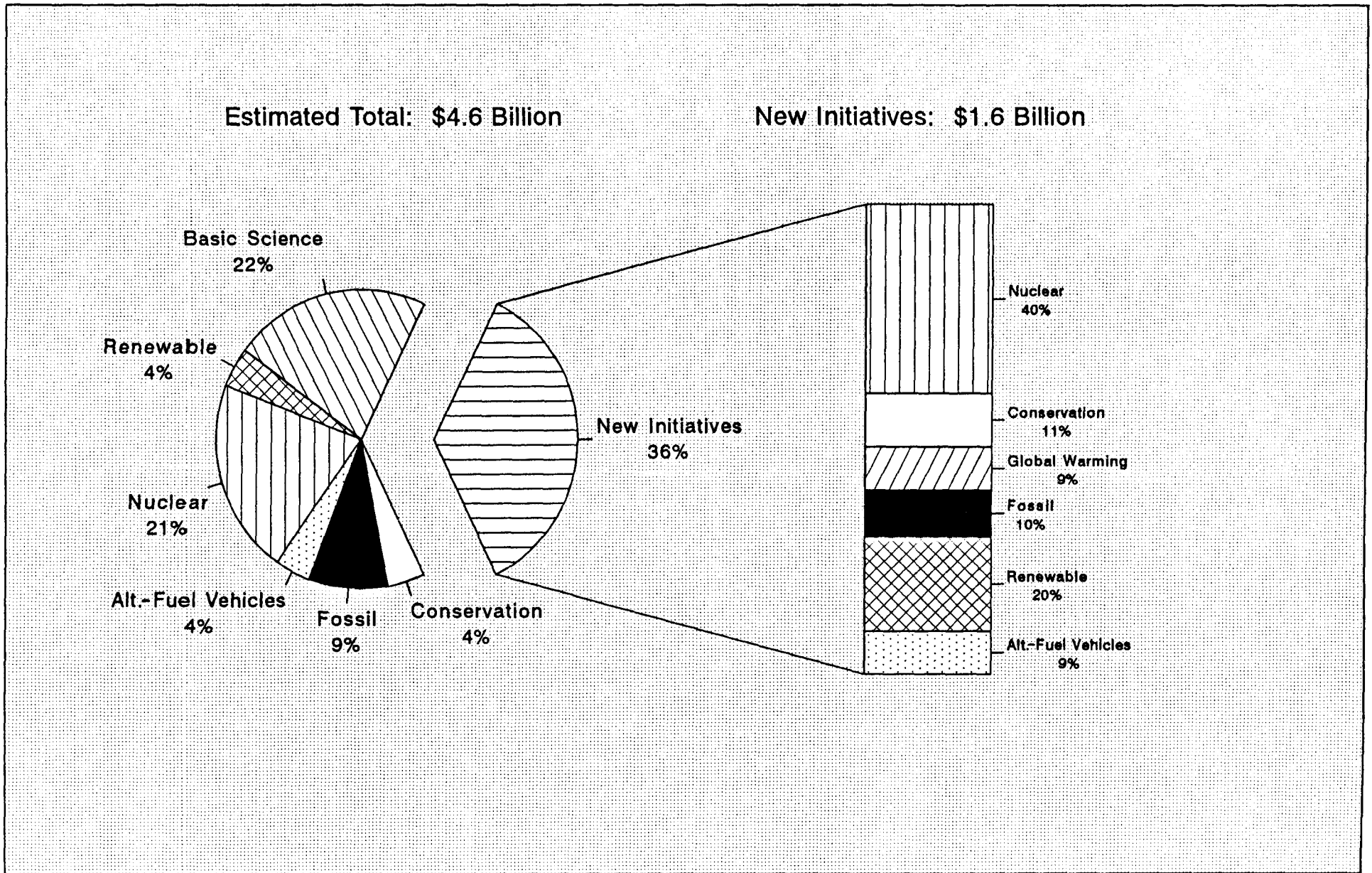
SOURCE: Congressional Budget Office.

alternative-fuel vehicles, renewable energy, fossil energy, global warming, and energy conservation.

For 1994, about two-thirds of the funding authorized by the act is to continue current efforts. The picture for new program authorizations changes somewhat from 1993 to 1994, however. The Energy Policy Act's spending goals for new and expanded program activity grow to more than one-third of the 1994 authorizations (see Figure 3). About 40 percent of the new efforts in 1994 are directed at the nuclear energy category, largely for cleaning up uranium and thorium mill tailings and federal uranium enrichment facilities. The act also authorizes significant new spending in 1994 for the alternative motor fuels program and for renewable energy--mostly for a renewable-energy incentive program. The increased emphasis on new initiatives in 1994 reflects the fact that the Energy Policy Act was completed after Congress had already passed most of the appropriations for 1993.

After 1994, the only major new authorization in the act is an effort to improve energy efficiency in federally owned or operated buildings by completing efficiency projects that will have a payback period of 10 years or less. Other than that, however, the post-1994 picture is unclear. Several of the major ongoing programs--such as basic energy sciences and nuclear energy--are barely authorized beyond 1994, while authorizations for some of the new programs, such

Figure 3. Energy Policy Act Authorizations for Fiscal Year 1994:
Continuing Programs by Category vs. New Initiatives



as federal investments in energy conservation, grow significantly. Because the act's authorizations for years after 1994 are incomplete, it is difficult to compare programs or discern relative priorities beyond that time.

Much of DOE's efforts to secure appropriations for programs authorized by the act are likely to focus on the budget request for fiscal year 1994 and perhaps a request for supplemental funding in fiscal year 1993. As emphasized earlier, decisions about appropriations will ultimately determine which new program efforts are fully implemented.

Direct Spending and Receipts

Although this memorandum focuses on authorizations of appropriations contained in the Energy Policy Act, the act's effects on direct spending and receipts (tax revenues) are significant and thus warrant some discussion. Effects on direct spending and receipts will occur without any additional legislative action--unlike authorizations, which have no budgetary effect until appropriations translate them into spending authority (see Box 1).

The Congressional Budget Office estimates that the act will directly increase federal outlays by \$68 million in fiscal year 1993 and by \$505 million

over the 1993-1997 period. CBO also estimates that net federal revenues will increase by \$605 million in fiscal year 1993 and by \$1.6 billion through 1997 as a result of numerous changes to the Internal Revenue Code. These outlay and revenue numbers, summarized in Table 2, constitute CBO's estimates of the effects that will occur without any additional legislative action. (Although the estimates extend only through 1997, the act's provisions will affect direct spending and receipts in later years.)

The direct outlay changes in the Energy Policy Act stem from three program areas: new entitlement spending on health care for certain coal miners, new offsetting receipts to pay for decontamination and decommissioning of federal uranium enrichment facilities, and an increase in construction spending by the Bonneville Power Administration (BPA). CBO estimates that, through 1997, the new benefits for coal miners will increase outlays by about \$1.2 billion, the new receipts from uranium enrichment fees will reduce outlays by \$806 million, and the new spending by BPA will increase outlays by \$64 million.

With the intention of encouraging energy efficiency and promoting the use of alternative energy sources, the Energy Policy Act will affect federal revenues by altering certain tax provisions. These preferences are financed through other changes in the tax code that will increase revenues, including the extension of some existing fees. In addition, increased taxes will pay for the coal miner

TABLE 2. EFFECTS OF THE ENERGY POLICY ACT ON DIRECT SPENDING AND RECEIPTS (In millions of dollars, by fiscal year)

	1993	1994	1995	1996	1997	1993– 1997
Direct Spending						
Coal miner benefits	218	300	250	243	236	1,247
Uranium enrichment ^a	-150	-155	-161	-167	-173	-806
Bonneville Power	0	13	19	22	10	64
Total	68	158	108	98	73	505
Receipts (Net revenues)	605	453	327	178	37	1,600
Net Impact on the Deficit	-537	-295	-219	-80	36	-1,095

SOURCE: Congressional Budget Office.

a. Under the act, spending for cleaning up uranium enrichment facilities is subject to appropriations; only the fees have an effect on direct spending. The act authorizes appropriations totaling about \$500 million per year for cleaning up the facilities; the fees shown in the table would offset part of that spending.

benefits mentioned above. In sum, the act's revenue provisions will increase net federal receipts by \$1.6 billion over the 1993-1997 period.

The remaining sections of this memorandum discuss new authorizations and continuing program authorizations by major spending category and provide historical data for spending in each category.

ALTERNATIVE-FUEL VEHICLES

The Energy Policy Act authorizes \$340 million in 1993 and about \$1.1 billion through 1997 for activities to encourage the use of alternative motor fuels such as natural gas, ethanol, and electricity. If appropriated, this funding would result in a substantial increase in federal expenditures to encourage the use of alternative fuels. By comparison, in 1993, DOE plans to spend about \$165 million on alternative-fuel vehicle (AFV) research, development, and demonstration. The Energy Policy Act authorizes five AFV initiatives:

- \$440 million over the 1993-1997 period for researching and demonstrating electric vehicles, encouraging development of an electric vehicle infrastructure, and subsidizing the purchase of electric vehicles;
- \$280 million over the 1993-1994 period for conservation research in the transportation sector, including the use of alternative fuels;

- \$165 million over five years for low-interest loans, cooperative agreements, and joint ventures to purchase alternative-fuel buses and light-duty vehicles;
- \$100 million over five years for the federal government to acquire AFVs and associated fueling facilities; and
- \$110 million over the five-year period to encourage state and local planning for alternative-fuel use.

The largest AFV program authorized by the Energy Policy Act is the five-year, \$440 million program for research, development, and demonstration of electric vehicles and associated equipment and infrastructure. Current spending for this activity is about \$60 million a year. The Energy Policy Act would for the first time authorize subsidies for the purchase of electric vehicles by firms and individuals. Section 611 establishes a program to pay for the difference in cost between conventional vehicles and electric vehicles, up to a maximum of \$10,000 per vehicle. The act authorizes \$50 million over 10 years for this program.

Most of DOE's current spending in the area of alternative fuels is for research and development of alternative-fuel engines, improvements in motor vehicle efficiency, and production of biofuels. In 1993, the Congress appropriated about \$93 million for these activities--over 20 percent less than the

\$119 million authorized by the Energy Policy Act for 1993. In 1994, this authorization grows to \$160 million.

The money authorized for the federal government's acquisition of AFVs, for joint ventures to purchase alternative-fuel buses, and for demonstration of alternative-fuel use in trucks would increase current spending in this area by more than 300 percent. In 1992 and 1993, the Congress appropriated about \$10 million to implement the Alternative Motor Fuels Act (AMFA), which directs agencies to secure the largest number of AFVs that is practical. DOE received \$4.5 million and \$6.8 million in 1990 and 1991, respectively, to carry out the AMFA. In 1991, 65 alternative-fuel vehicles were acquired for the federal vehicle fleet; for 1992, DOE estimated that the government would buy an additional 3,200 AFVs. The federal government purchases about 44,000 light-duty vehicles annually. The Energy Policy Act would mandate that half of the government's vehicle purchases be AFVs by 1998.

RENEWABLE ENERGY

Spending on renewable energy research would more than double if the Congress appropriates as much funding as the Energy Policy Act authorizes. The Congress has already increased appropriations for solar and renewable energy research,

electric systems and energy storage, and geothermal energy programs over the last few years (see Table 3). In particular, appropriations for solar and renewable energy activities have doubled since 1990, although the recent appropriations are still much lower than funding in the late 1970s and early 1980s. In real terms (accounting for inflation), recent funding for these programs is less than 25 percent of the 1980 and 1981 levels. Similarly, funding for geothermal energy research has increased somewhat in recent years but is still much smaller than the funding levels of 10 to 12 years ago.

For research on solar energy, the Congress appropriated \$187 million for 1993, out of total appropriations for nonnuclear and nonfossil energy programs of \$253 million. By comparison, the act authorizes appropriations of \$416 million for 1993 research in the renewable, geothermal, and hydropower program areas, according to CBO's estimates. This represents 13 percent of the total estimated authorizations in the act for fiscal year 1993. Over the five-year period ending with 1997, the act authorizes an estimated \$1.5 billion for renewable energy programs.

The authorizations for renewable energy are dominated by three activities: continuing DOE's program to develop commercial technologies for electricity generation using renewable energy sources, funded at about \$200 million per year; establishing a new "innovative technology transfer" program for renewable

TABLE 3. HISTORY OF FUNDING FOR RENEWABLE AND OTHER ENERGY R&D (Budget authority in millions of dollars)

Fiscal Year	Solar/ Renewable	Electric Systems and Storage	Geothermal	Total
1980	584	104	140	828
1981	504	87	143	734
1982	257	59	54	370
1983	202	43	50	295
1984	182	44	31	257
1985	178	40	32	250
1986	145	29	27	201
1987	124	28	21	173
1988	97	30	21	148
1989	92	37	20	149
1990	90	30	18	138
1991	131	41	28	200
1992	176	38	27	241
1993	187	43	23	253
1980–1993	2,949	653	635	4,237

SOURCES: Department of Energy, *Budget Highlights* (1980 through 1990), and *Budget Overview* (1991 through 1993); U.S. House of Representatives, *Making Appropriations for Energy and Water Development for the Fiscal Year Ending September 30, 1993, and for Other Purposes*, Report No. 102–886 (September 15, 1992).

NOTE: The table entries are the amounts of budget authority provided by appropriations at the beginning of each fiscal year. They do not necessarily reflect final, end-of-year obligations for each program; for example, they are not adjusted for any transfers or reprogramming of funds that may have occurred during a year. Including such changes, however, would not significantly affect the funding pattern shown above.

energy, with new authorizations of \$100 million a year; and creating a new energy production incentive that CBO estimates would cost more than \$75 million per year, beginning in 1993.

Starting in 1994, the act also authorizes \$50 million for demonstration and commercial application projects for renewable energy and energy-efficiency technologies. This initiative could fund a large variety of technology areas, including biomass conversion, photovoltaic energy, fuel cells, wind energy, and geothermal energy. In addition, the act authorizes \$10 million per year through 1995 for an interagency working group on renewable energy.

As is the case for many of the programs addressed in the Energy Policy Act, authorizations of renewable energy appropriations after 1994 are incomplete. For example, funding for technologies that use renewable resources in generating electricity could continue for many years, even though the act authorizes such research only for 1993 and 1994.

ENERGY CONSERVATION

Titles I and XXI of the Energy Policy Act include a broad range of provisions dealing with energy efficiency--some regulatory in nature, some aimed at research

and development of energy-efficient technology, and others authorizing new grant programs to promote energy conservation. In total, the act authorizes \$277 million for conservation programs in fiscal year 1993 and nearly \$1.5 billion over the 1993-1997 period. The bulk of these authorizations apply to an aggressive expansion of the existing Federal Energy Management Program (FEMP), which is charged with reducing the government's own energy use, and a technology research program aimed at improved energy efficiency in the buildings, industrial, and utility sectors. The act's authorizations of appropriations for conservation do not encompass all existing federal activities, however. For example, the act does not include authorizations for the current conservation grants programs.

Appropriations to the DOE conservation account in 1993 total more than \$560 million, which is almost double the amount authorized in the act for that year. The 1993 appropriation includes about \$250 million for energy conservation grants and more than \$300 million for conservation research and development. The Energy Policy Act authorizes \$178 million for conservation research in 1993, and some of the targeted activities are the same as those covered by the \$300 million appropriation. Specifically, the act's "efficiency improvement" authorization of \$178 million is targeted toward the buildings, industry, and utility sectors. DOE's conservation account also includes the transportation programs, such as alternative-fuel vehicles, as discussed above.

The Congress has gradually increased funding for conservation programs over the last several years, but in real terms, the 1993 appropriation is still 35 percent smaller than the total appropriation for conservation in 1981 (see Table 4). After significant cuts in the 1980s, however, appropriations for conservation have grown by about 50 percent in real terms since 1989.

The Energy Policy Act calls for continuing to increase the federal government's conservation efforts by authorizing new conservation activities in addition to the existing research and grants program. The largest example is a new requirement that federal agencies attempt to undertake all energy-efficiency improvements that have an estimated payback period of 10 years or less (that is, projects whose capital costs are less than estimated operational savings over 10 years). The act authorizes no money for this new FEMP activity in 1993, specifies modest authorizations of \$10 million for 1994 and \$50 million for 1995, and authorizes appropriations of "such sums as necessary" for future years. Based on information from DOE, CBO estimates that meeting the goal of completing all 10-year payback projects by 2005 would require appropriations of more than \$4 billion over the next 12 years. Of this total, CBO estimates "such sums" authorizations of \$250 million for 1996 and \$350 million for 1997.

TABLE 4. HISTORY OF FUNDING FOR ENERGY CONSERVATION
(Budget authority in millions of dollars)

Fiscal Year	Research and Development	Grants ^a	Total
1980	359	456	815
1981	308	420	728
1982	146	220	366
1983	195	234	429
1984	150	280	430
1985	174	283	457
1986	170	257	427
1987	154	214	368
1988	155	212	367
1989	162	211	373
1990	192	217	409
1991	228	267	495
1992	271	264	535
1993 ^b	323	256	579
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1980–1993	2,987	3,791	6,778

SOURCES: Department of Energy, *Budget Highlights* (1980 through 1993), *Budget Overview* (1991 through 1993), and *State and Local Assistance*, Report No. DOE/CE–0251 (1988); U.S. House of Representatives, *Making Appropriations for the Department of the Interior and Related Agencies, for the Fiscal Year Ending September 30, 1993, and for Other Purposes*, Report No. 102–901 (September 24, 1992).

NOTE: The table entries are the amounts of budget authority provided by appropriations at the beginning of each fiscal year. They do not necessarily reflect final, end-of-year obligations for each program; for example, they are not adjusted for any transfers or reprogramming of funds that may have occurred during a year. Including such changes, however, would not significantly affect the funding pattern shown above.

a. Grants for all state and local programs, including program administration costs. Totals for grants do not reflect offsetting collections that come from the settlement of government cases for alleged oil price overcharges by private companies during price regulation in the 1970s. Since 1987, \$360 million in such collections has been credited to the conservation account.

b. The 1993 entries are estimates, pending final account split.

The act also includes small authorizations for a wide range of new energy conservation activities, including grants to Indian tribes, new work on process-oriented industrial energy efficiency, and more assistance to states for energy conservation. Again, comparing these authorizations with past spending by the federal government on energy conservation is difficult. There is some overlap between the act's authorizations and the existing DOE conservation program, but the act does not appear to cover all ongoing activities. The authorizations for new conservation activities would expand federal conservation efforts, but the net increase in spending would be significant only in the FEMP area.

NUCLEAR ENERGY

For nuclear energy programs, the Energy Policy Act authorizes approximately \$570 million for fiscal year 1993 and an estimated \$3.3 billion through 1997. This five-year sum is by far the largest category total in the Energy Policy Act; nuclear energy claims 27 percent of the authorizations of appropriations for the 1993-1997 period. This amount is more than double the act's five-year authorization for renewable energy, more than double the amount for conservation, and triple the amount for alternative-fuel vehicles. (For 1993, however, the nuclear authorizations are lower than the authorizations for basic energy sciences.)

The nuclear energy authorizations for 1993 and 1994 include more than \$300 million per year for fusion research and more than \$200 million a year for advanced fission reactors. In real terms (accounting for inflation), funding for these two programs is currently about one-third of the level provided in the early 1980s. At that time, funding was dominated by spending on an experimental nuclear breeder reactor, which was canceled in the middle of the decade. In recent years, funding has been split nearly equally between fission and fusion research, with the total for the two programs averaging roughly \$640 million a year (see Table 5). In real terms, however, the 1993 appropriation is more than 5 percent below the 1992 appropriation and about 10 percent below the 1990 funding level.

The amount actually appropriated for fusion research in fiscal year 1993 is the same as the amount authorized in the Energy Policy Act, \$340 million. Comparing the authorization and appropriations for the fission program is more complicated. For 1993, the act authorizes \$213 million for research on advanced reactors--similar to amounts appropriated for such research in 1993. The 1993 appropriation for fission totals \$307 million, however, because it also includes about \$100 million for research to improve conventional fission reactors. The act does not contain any authorization for such research.

TABLE 5. HISTORY OF FUNDING FOR NUCLEAR ENERGY R&D
(Budget authority in millions of dollars)

Fiscal Year	Nuclear Fission ^a	Magnetic Fusion	Total
1980	867	356	1,223
1981	785	383	1,168
1982	834	454	1,288
1983	710	447	1,157
1984	550	471	1,021
1985	415	437	852
1986	376	366	742
1987	328	345	673
1988	347	335	682
1989	353	351	704
1990	342	320	662
1991	306	275	581
1992	332	337	669
1993	307	340	647
1980–1993	6,852	5,217	12,069

SOURCES: Department of Energy, *Budget Highlights* (1980 through 1990), and *Budget Overview* (1991 through 1993); U.S. House of Representatives, *Making Appropriations for Energy and Water Development for the Fiscal Year Ending September 30, 1993, and for Other Purposes*, Report No. 102–886 (September 15, 1992).

NOTE: The table entries are the amounts of budget authority provided by appropriations at the beginning of each fiscal year. They do not necessarily reflect final, end-of-year obligations for each program; for example, they are not adjusted for any transfers or reprogramming of funds that may have occurred during a year. Including such changes, however, would not significantly affect the funding pattern shown above.

a. Fission research and development (R&D) includes funding for light water reactor, breeder reactor, and advanced reactor R&D. Fission R&D spending in the early 1980s (as well as in the late 1970s) was dominated by the Clinch River Breeder Reactor project. The fission R&D totals do not include funding for nuclear waste R&D, environmental restoration at federal nuclear sites, nuclear safety R&D, or any of the defense nuclear R&D that is funded in budget function 050 (defense).

In addition to fission and fusion research, the government's nuclear activities include efforts to dispose of nuclear waste and costs associated with operating a uranium enrichment enterprise. The act authorizes \$364 million of new spending to support the commercializing of a new uranium enrichment technology known as AVLIS (atomic vapor laser isotope separation). Since 1973, the Congress has appropriated more than \$1.2 billion for developing the AVLIS technology.

The act also authorizes \$310 million to assist private uranium and thorium producers in cleaning up their production wastes. (The private producers would pay any additional cleanup costs for active uranium production sites.) To begin cleaning up the government's uranium enrichment facilities, the act also authorizes about \$350 million per year, to be combined with utility industry fees of about \$150 million per year, for a \$500 million per year decontamination and decommissioning program. According to DOE, the General Accounting Office, and private studies, the total costs of cleaning up the government's enrichment facilities could exceed \$20 billion over the next 30 to 40 years.

Although the government now spends about \$400 million a year toward establishing a disposal facility for commercial nuclear waste, the act authorizes only \$6 million for spending on nuclear waste disposal in fiscal year 1993. The new activities authorized are a new nuclear waste study and a waste management

plan. In addition, DOE spends more than \$5 billion per year on environmental restoration and waste management activities associated with federal nuclear and hazardous wastes--primarily related to defense (nuclear weapons) programs. The Energy Policy Act does not address these activities.

FOSSIL ENERGY

The Energy Policy Act continues DOE's authorization to develop technologies that will increase the supply of fossil energy and make better use of fossil fuels. In 1993, the Congress appropriated \$422 million for fossil energy research. The act authorizes even more spending for this research--\$525 million in 1993 and a total of \$2.3 billion over the 1993-1997 period.

Total appropriations for fossil energy have not changed much over the last few years, after falling dramatically early in the 1980s (see Table 6). Accounting for inflation, the 1993 appropriation is less than half the appropriations for fossil energy in 1980 and 1981.

Funding for coal-related research has dominated the fossil energy program throughout its history. This priority would not change under the Energy Policy Act. Of the \$2.3 billion authorized by the act for fossil energy research through

TABLE 6. HISTORY OF FUNDING FOR FOSSIL ENERGY R&D
(Budget authority in millions of dollars)

Fiscal Year	Coal	Oil	Gas	Total ^a
1980	640	61	31	733
1981	729	58	31	821
1982	514	41	12	567
1983	253	32	10	347
1984	233	30	15	331
1985	251	32	10	349
1986	246	29	9	340
1987	203	26	8	293
1988	234	29	11	324
1989	242	38	11	380
1990	275	40	14	417
1991	289	59	16	455
1992	279	57	13	444
1993	239	62	30	422
1980–1993	4,627	594	221	6,223

SOURCES: Department of Energy, *Budget Highlights* (1980 through 1993), and *Budget Overview* (1991 through 1993); U.S. House of Representatives, *Making Appropriations for the Department of the Interior and Related Agencies for the Fiscal Year Ending September 30, 1993, and for Other Purposes*, Report No. 102–901 (September 24, 1992).

NOTE: This table does not include funding for the Clean Coal Technology program. Since beginning in 1986, this program has received about \$2.7 billion in appropriations. The table entries are the amounts of budget authority provided to the Fossil Energy account by appropriations at the beginning of each fiscal year. They do not necessarily reflect final, end-of-year obligations for each program; for example, they are not adjusted for any transfers or reprogramming of funds that may have occurred during a year. Including such changes, however, would not significantly affect the funding pattern shown above.

a. Totals also include program direction and support and other spending in the fossil energy account that is not technology-specific.

The act also maintains DOE's current spending on enhanced oil recovery, authorizing \$57 million in 1993 and \$70 million in 1994; the Congress has appropriated \$57 million for 1993.

GLOBAL WARMING

The Energy Policy Act authorizes appropriations of \$500 million through 1997 to help U.S. companies transfer to other countries various technologies and services that reduce environmental pollutants, including greenhouse gases. In addition, the act authorizes about \$150 million, according to CBO's estimates, to assist global efforts in mitigating and adapting to global climate change. These two programs would be new efforts for the federal government since no federal funds are currently being spent on this work.

To date, federal efforts in this area have been focused on researching and understanding global climate change. In 1992, 11 federal agencies allotted \$1.1 billion to this work. Almost 80 percent of this money was spent by the National Aeronautics and Space Administration and the National Science Foundation; DOE had \$77 million earmarked for research on global climate change in 1992.

In 1991, funding for global climate research totaled nearly \$1 billion; the 1990 total was approximately \$650 million. (Pre-1990 research is much harder to identify within agency spending totals, but such research efforts were much smaller than for 1990 through 1992.)

BASIC ENERGY SCIENCES

The largest single authorizations of appropriations in the Energy Policy Act for fiscal years 1993 and 1994 are aimed at continuing DOE's basic sciences research program. The act directs DOE to use the \$2 billion authorized over the 1993-1994 period to provide basic research support for the development of energy and energy-related technologies, including the efficient production and use of energy, and the expansion of basic knowledge about materials, physics, chemistry, geology, and other related areas of advancing technology development. In 1993, the Congress appropriated \$966 million for DOE research in basic energy sciences, the same amount authorized by the act. Funding for this research has increased dramatically in the last several years (see Table 7). Most of the increase is attributable to funding for the planned Superconducting Super Collider, which accounts for more than half of the 1992 and 1993 appropriations.

TABLE 7. HISTORY OF FUNDING FOR BASIC ENERGY SCIENCES
 (Budget authority in millions of dollars)

Fiscal Year	Basic Energy Sciences
1980	252
1981	285
1982	243
1983	283
1984	337
1985	423
1986	434
1987	525
1988	437
1989	549
1990	570
1991	712
1992	765
1993	966
1980–1993	6,781

SOURCES: Department of Energy, *Budget Highlights* (1980 through 1990), and *Budget Overview* (1991 through 1993); U.S. House of Representatives, *Making Appropriations for Energy and Water Development for the Fiscal Year Ending September 30, 1993, and for Other Purposes*, Report No. 102–886 (September 15, 1992).

NOTE: The table entries are the amounts of budget authority provided by appropriations at the beginning of each fiscal year. They do not necessarily reflect final, end-of-year obligations for each program; for example, they are not adjusted for any transfers or reprogramming of funds that may have occurred during a year. Including such changes, however, would not significantly affect the funding pattern shown above.

APPENDIX:
DETAILED AUTHORIZATION TABLES

TABLE A-1. SPECIFIED AUTHORIZATIONS IN THE ENERGY POLICY ACT
(In millions of dollars, by fiscal year)

Section - Authorization Description	1993	1994	1995	1996	1997	1993-1997
Sec. 103 - Energy-Efficiency Lighting and Bldg. Centers	0	10	10	10	0	30
Sec. 112 - Energy-Efficiency Grants to States	0	5	5	5	0	15
Sec. 152 - FEMP (10-yr. payback projects)	0	10	50	*	*	60
Sec. 152 - Financial Incentive Prog. for Facility Mgrs.	0.25	0.25	0.25	0	0	1
Sec. 152 - FEMP Demonstration of New Technology	5	5	5	0	0	15
Sec. 305 - Fed. Agency Promotion/Awards	0	0.04	*	*	0	0.04
Sec. 409 - State & Local Incentives for Alt. Fuels	0	10	10	10	10	40
Sec. 410 - Alternative-Fuel Bus Program	30	30	30	0	0	90
Sec. 414 - Low-Interest Loans for Small Bus. Fleets	25	25	25	0	0	75
Sec. 514 - Alt.-Fuel Fleets (Fuel Supply, Enforcement)	10	10	10	10	10	50
Sec. 616 - Elec. Vehicle Commercial Demonstration ^a	0	5	5	5	5	20
Sec. 626 - Elec. Vehicle Infrastructure Support ^b	0	8	8	8	8	32
Sec. 901 - AVLIS Commercialization Fund	0	364	0	0	0	364
Sec.1003- Remedial Action (Uranium/thorium tailings)	0	310	0	0	0	310
Sec.1202- Renewables Demonstration/Commercial.	0	50	0	0	0	50
Sec.1203- Renewable Energy Export Tech. Training	0	6	6	6	0	18
Sec.1204- Renewable Energy Advancement Awards	0	0.05	0.05	0.05	0	0.2
Sec.1207- Interagency Working Group on Renewables	10	10	*	0	0	20
Sec.1210- Outreach Information for Renewables Export	0.5	0.5	*	0	0	1
Sec.1211- Innovative Renewables Technology Transfer	100	100	100	100	100	500
Sec.1313- Coal Research, Development, and Demon.	278	*	*	*	*	278
Sec.1332- Innovative Coal Technology Transfer	100	100	100	100	100	500
Sec.1608- Global Climate Change Technology Transfer	100	100	100	100	100	500
Sec.1609- Global Climate Change Response Fund	0	50	*	*	0	50
Sec.2011- Enhanced Oil Recovery	57	70	0	0	0	127
Sec.2012- Oil Shale	5	6	0	0	0	11
Sec.2013- Natural Gas Supply, End-Use, Research	30	45	0	0	0	75
Sec.2021- Adv. Fuel Economy, Alt. Fuels, Biofuels, ...	119	160	0	0	0	279
Sec.2021- Oil Demand Reduction: Elec. Vehicles	60	75	80	80	90	385
Sec.2101- Improved Energy Efficiency	178	275	0	0	0	453
Sec.2111- Renewables for Electricity Generation	209	275	0	0	0	484
Sec.2113- Civilian Nuclear Waste Study	5	*	0	0	0	5
Sec.2114- Fusion R&D	340	380	0	0	0	720
Sec.2115- Fuel Cells R&D	52	56	0	0	0	108
Sec.2116- Fast Flux Test Facility	c	0	0	0	0	0
Sec.2118- Electric and Magnetic Fields R&D ^d	13	13	13	13	13	65
Sec.2126- Advanced Nuclear Reactors	213	*	0	0	0	213
Sec.2203- Supporting Research, Basic Science, ...	967	*	0	0	0	967
Sec.2603- Indian Resources: Loans and Grants	0	30	30	30	30	120
Sec.2604- Indian Resources: Regulation	0	10	10	10	10	40
Sec.2605- Indian resources: Commission	0	1	0	0	0	1
Sec.3015- Energy Subsidy Study	0.5	0.5	0	0	0	1
Total^e	2,907	2,605	597	487	476	7,073

SOURCES: Congressional Budget Office; U.S. House of Representatives, *Energy Policy Act of 1992: Conference Report to Accompany H.R. 776*, Report No. 102-1018 (October 5, 1992).

NOTES: * = "such sums as necessary"; totals do not include any "such sums" authorizations (see Table A-2).
FEMP = Federal Energy Management Program; AVLIS = atomic vapor laser isotope separation;
R&D = research and development.

- a. Authorization is "\$50 million for the 10-year period beginning with the first full year after enactment."
- b. Authorization is "\$40 million for the 5-year period beginning with the first full year after enactment."
- c. Authorization for Fast Flux is "\$70 million in 1993 "to be derived from amounts appropriated ... for the environmental restoration" In other words, this authorization is just an earmarking.
- d. Authorization is "\$65 million for the period ... 1993 through 1997."
- e. Additional specified authorizations after 1997: \$348 million (almost all in fiscal year 1998).

TABLE A-2. ESTIMATED AUTHORIZATIONS IN THE ENERGY POLICY ACT
(In millions of dollars, by fiscal year)

Section - Authorization Description	1993	1994	1995	1996	1997	1993- 1997
Out-Year Estimates for Initially Specified Authorizations						
Sec. 152 - FEMP (10-yr. payback projects)	0	*	*	250	350	600
Sec. 305 - Fed. Agency Promotion/Awards	0	*	0.04	0	0	0.1
Sec.1207- Interagency Working Group on Renewables	*	*	10	0	0	10
Sec.1210- Outreach Information for Renewables Export	*	*	0.5	0	0	0.5
Sec.1313- Coal Research, Development, and Demon.	*	288	298	308	319	1,213
Sec.1609- Global Climate Change Response Fund	0	*	52	54	0	105
Sec.2113- Civilian Nuclear Waste Study	*	5	0	0	0	5
Sec.2126- Advanced Nuclear Reactors	*	220	0	0	0	220
Sec.2203- Supporting Research, Basic Science, ...	*	1,001	0	0	0	1,001
Subtotal	0	1,514	360	612	669	3,155
Other "Such Sums" Authorizations						
Sec. 101 - State Building Codes	6	8	6	3	2	25
Sec. 106 - Energy-Efficiency Mortgage Program	2	1	0	0	0	3
Sec. 131 - Industrial Facility Energy Efficiency	3	2	0	0	0	5
Sec. 132 - Process-Oriented Industrial Energy Efficiency	10	12	13	1	1	37
Sec. 141 - Amend State Energy Conservation Program	50	0	0	0	0	50
Sec. 168 - Energy Manage. Requirements for Congress	20	0	0	0	0	20
Sec. 303 - Federal Fleet Alternative-Fuel Vehicles	60	0	0	0	0	60
Sec. 304 - Refueling for Alt.-Fuel Vehicles	31	4	4	4	4	47
Sec. 405 - Truck Commercial Applications for Alt. Fuels	4	4	4	4	4	20
Sec. 803 - Nuclear Waste Management Plan	1	0	0	0	0	1
Sec.1101- Uranium Enrichment Facilities Cleanup Fund	0	330	342	354	366	1,391
Sec.1212- Renewable Energy Production Incentive	75	78	81	84	88	406
Sec.1341- Other Coal Provisions	3	1	1	1	1	7
Sec.2404- Hydropower Studies: Federal Facilities	10	0	0	0	0	10
Sec.2405- Water Conservation/Energy Product. Studies	10	0	0	0	0	10
Sec.2407- Fees for Alaska Fish and Wildlife	0	0	0	0	0	0
Sec.2501- Hot Dry Rock Geothermal Program	2	2	2	2	2	10
Sec.2606- Tribal Government Energy Assistance	2	2	1	1	1	7
Sec.2701- Insular Areas Energy Security	2	2	2	2	2	10
Sec.3014- Use of Energy Futures for Fuel Purchases	0.5	0	0	0	0	1
Sec.3016- Tar Sands Study	0.25	0	0	0	0	0
Subtotal	292	446	456	456	471	2,120
Total	292	1,960	816	1,067	1,140	5,275
Total Authorizations in Act (Specified plus estimated)	3,199	4,566	1,413	1,554	1,616	12,348

SOURCE: Congressional Budget Office estimates based on U.S. House of Representatives, *Energy Policy Act of 1992: Conference Report to Accompany H.R. 776*, Report No. 102-1018 (October 5, 1992).

NOTES: * = specified amounts for marked years (see Table A-1).
FEMP = Federal Energy Management Program.

TABLE A-3. ENERGY POLICY ACT AUTHORIZATIONS, BY SPENDING CATEGORY
(In millions of dollars, by fiscal year)

Section - Authorization Description	1993	1994	1995	1996	1997	1993- 1997
Alternative-Fuel Vehicles						
Sec. 409 - State and Local Incentives for Alt. Fuels	0	10	10	10	10	40
Sec. 405 - Truck Commercial Applications for Alt. Fuels	4	4	4	4	4	20
Sec. 410 - Alternative-Fuel Bus Program	30	30	30	0	0	90
Sec. 303 - Federal Fleet Alternative-Fuel Vehicles	60	0	0	0	0	60
Sec. 304 - Refueling for Alt.-Fuel Vehicles	31	4	4	4	4	47
Sec.2021 - Adv. Fuel Economy, Alt. Fuels, Biofuels, ...	119	160	0	0	0	279
Sec. 616 - Elec. Vehicle Commercial Demonstration	0	5	5	5	5	20
Sec. 626 - Elec. Vehicle Infrastructure Support	0	8	8	8	8	32
Sec. 514 - Alt.-Fuel Fleets (Fuel supply, enforcement)	10	10	10	10	10	50
Sec.2021 - Oil Demand Reduction: Elec.Vehicles	60	75	80	80	90	385
Sec. 414 - Low-Interest Loans for Small Bus. Fleets	<u>25</u>	<u>25</u>	<u>25</u>	<u>0</u>	<u>0</u>	<u>75</u>
Total	339	331	176	121	131	1,098
Energy Conservation						
Sec. 131 - Industrial Facility Energy Efficiency	3	2	0	0	0	5
Sec. 132 - Process-Oriented Industrial Energy Efficiency	10	12	13	1	1	37
Sec. 152 - FEMP (10-yr. payback projects)	0	10	50	250	350	660
Sec. 101 - State Building Codes	6	8	6	3	2	25
Sec. 106 - Energy-Efficiency Mortgage Program	2	1	0	0	0	3
Sec. 152 - FEMP Demonstration of New Technology	5	5	5	0	0	15
Sec. 152 - Financial Incentive Prog. for Facility Mgrs.	0	0	0	0	0	1
Sec. 141 - Amend State Energy Conservation Program	50	0	0	0	0	50
Sec. 168 - Energy Manage. Requirements for Congress	20	0	0	0	0	20
Sec. 103 - Energy-Efficiency Lighting and Bldg. Centers	0	10	10	10	0	30
Sec.2101- Improved Energy Efficiency	178	275	0	0	0	453
Sec.2606- Tribal Government Energy Assistance	2	2	1	1	1	7
Sec.2604- Indian Resources: Regulation	0	10	10	10	10	40
Sec.2603- Indian Resources: Loans and Grants	0	30	30	30	30	120
Sec. 112 - Energy-Efficiency Grants to States	<u>0</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>0</u>	<u>15</u>
Total	277	371	130	310	394	1,482
Fossil Energy						
Sec.1313- Coal Research, Development, and Demon.	278	288	298	308	319	1,491
Sec.1341- Other Coal Provisions	3	1	1	1	1	7
Sec.3016- Tar Sands Study	0	0	0	0	0	0
Sec.2012- Oil Shale	5	6	0	0	0	11
Sec.1332- Innovative Coal Technology Transfer	100	100	100	100	100	500
Sec.2011- Enhanced Oil Recovery	57	70	0	0	0	127
Sec.2115- Fuel Cells R&D	52	56	0	0	0	108
Sec.2013- Natural Gas Supply, End-Use, Research	<u>30</u>	<u>45</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>75</u>
Total	525	566	399	409	420	2,319

(Continued)

TABLE A-3. CONTINUED

Section – Authorization Description	1993	1994	1995	1996	1997	1993 – 1997
Nuclear Energy						
Sec.2113– Civilian Nuclear Waste Study	5	5	0	0	0	10
Sec.2114– Fusion R&D	340	380	0	0	0	720
Sec.2118– Electric and Magnetic Fields R&D	13	13	13	13	13	65
Sec.2126– Advanced Nuclear Reactors	213	220	0	0	0	433
Sec. 901 – AVLIS Commercialization Fund	0	364	0	0	0	364
Sec.1003– Remedial Action (Uranium/thorium tailings)	0	310	0	0	0	310
Sec.1101– Uranium Enrichment Facilities Cleanup Fund	0	330	342	354	366	1,391
Total	571	1,623	355	367	379	3,294
Renewable Energy						
Sec.1203– Renewable Energy Export Tech. Training	0	6	6	6	0	18
Sec.1202– Renewables Demonstration/Commercial.	0	50	0	0	0	50
Sec.1207– Interagency Working Group on Renewables	10	10	10	0	0	30
Sec.1211– Innovative Renewables Technology Transfer	100	100	100	100	100	500
Sec.2111– Renewables for Electricity Generation	209	275	0	0	0	484
Sec.1212– Renewable Energy Production Incentive	75	78	81	84	88	406
Sec.2405– Water Conservation/Energy Prod. Studies	10	0	0	0	0	10
Sec.2501– Hot Dry Rock Geothermal Program	2	2	2	2	2	10
Sec.2404– Hydropower Studies: Federal Facilities	10	0	0	0	0	10
Total	416	522	200	192	190	1,520
Global Warming						
Sec.1609– Global Climate Change Response Fund	0	50	52	54	0	155
Sec.1608– Global Climate Change Tech. Transfer	100	100	100	100	100	500
Total	100	150	152	154	100	655
Basic Energy Sciences						
Sec.2203– Supporting Research, Basic Science, ...	967	1,001	0	0	0	1,968
Sec.2701– Insular Areas Energy Security	2	2	2	2	2	10
Total	970	1,003	2	2	2	1,979

SOURCE: Congressional Budget Office.

NOTES: Table excludes authorizations of \$1 million or less, but they are included in the category totals.
 FEMP = Federal Energy Management Program; R&D = research and development;
 AVLIS = atomic vapor laser isotope separation.