

October 2007

# FEDERAL ELECTRICITY SUBSIDIES

Information on  
Research Funding,  
Tax Expenditures, and  
Other Activities That  
Support Electricity  
Production



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## Abbreviations

BPA	Bonneville Power Administration
CBO	Congressional Budget Office
CREBs	Clean Renewable Energy Bonds
CRS	Congressional Research Service
DOE	Department of Energy
EIA	Energy Information Administration
FERC	Federal Energy Regulatory Commission
NRC	Nuclear Regulatory Commission
OMB	Office of Management and Budget
PMA	power marketing administration
R&D	research and development
RUS	Rural Utilities Service
SEPA	Southeastern Power Administration
SWPA	Southwestern Power Administration
Treasury	Department of the Treasury
TVA	Tennessee Valley Authority
USDA	Department of Agriculture
WAPA	Western Area Power Administration

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United States Government Accountability Office  
Washington, DC 20548

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October 26, 2007

The Honorable Thomas Carper  
Chairman  
Subcommittee on Clean Air and Nuclear Safety  
Committee on Environment and Public Works  
United States Senate

The Honorable Lamar Alexander  
Ranking Member  
Subcommittee on Public Sector Solutions to Global Warming, Oversight,  
and Children's Health Protection  
Committee on Environment and Public Works  
United States Senate

Electricity is vital to our daily lives, powering homes, businesses, and industries. Presently, electricity is generated largely by coal and other fossil fuels and nuclear power, with hydropower, and, to a lesser extent, renewable energy sources, such as wind. Because of electricity's importance to producers, consumers, and businesses, the federal government has undertaken a wide range of programs to develop the electricity sector, which includes fuel suppliers, electric utilities, and others in the electricity industry. These programs have sought to, among other things, develop the nation's electrical infrastructure, influence the types of fuels used to produce electricity, increase the use of renewable energy, and limit the harmful effects of electricity production.

These programs are financed through federal subsidies, broadly defined as payments made or benefits provided by the federal government to encourage certain desired activities or behaviors. For example, the federal government has, for many years, funded research and development (R&D) on fossil fuels, nuclear energy, renewable energy, other energy technologies, and related efforts through the Department of Energy (DOE). In addition, the federal government has provided favorable tax treatment, such as tax credits to companies that make certain types of energy investments. These tax preferences—which are legally known as tax expenditures—result in forgone revenue for the federal government. The revenue losses can be viewed as spending channeled through the tax system.

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As requested, we are providing information on (1) federal funding DOE receives for electricity-related R&D, including funding by type of fuel; (2) tax expenditures the federal government provides to subsidize electricity production, including expenditures by type of fuel; and (3) other ways the federal government subsidizes electricity. As discussed with your offices, we examined federal electricity-related subsidies over a 6-year period, from fiscal year 2002 through fiscal year 2007.

On September 6, 2007, we provided your offices with a briefing on the results of this review, including our scope and methodology. This report transmits the briefing slides, which are reprinted as appendix I.<sup>1</sup>

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## Results in Brief

We estimate that DOE's appropriations for electricity-related R&D, adjusted for inflation, totaled \$11.5 billion from fiscal year 2002 through fiscal year 2007.<sup>2</sup> These appropriations grew by 35 percent during the 6-year period we examined, increasing from \$1.6 billion in fiscal year 2002 to \$2.2 billion in fiscal year 2007. Funding for DOE's electricity-related R&D by fuel type (nuclear, fossil fuel, and renewables) include the following programs:

- *Nuclear programs.* Nuclear programs received the largest share of electricity-related R&D funding, with appropriations totaling \$6.2 billion from fiscal year 2002 through fiscal year 2007. Appropriations for nuclear programs grew by 59 percent, increasing from \$775 million in fiscal year 2002 to \$1.2 billion in fiscal year 2007. The greatest variation in funding within these programs occurred in the environmental cleanup program, which funds the cleanup of sites contaminated by nuclear research. Funding for this program increased from \$168 million in fiscal year 2002 to \$462 million in fiscal year 2005, before declining to \$350 million in fiscal year 2007. Other nuclear energy programs include research on fusion energy and the Advanced Fuel Cycle Initiative, which seeks to reduce nuclear fuel waste requiring geologic disposal.

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<sup>1</sup>Many of the briefing slides presented in app. I consist of high-level talking points and were not designed to represent a complete or exhaustive review of the programs and issues discussed.

<sup>2</sup>All dollar amounts for R&D funding and tax expenditures discussed in this report are inflation adjusted to 2007 dollars. Of the \$11.5 billion amount, we could assign \$10.7 billion to fuel types. The remaining unassigned portion of R&D funding was related to efforts to improve the transmission of electricity. In nominal dollars, we estimate that DOE's appropriations for electricity-related R&D totaled \$10.8 billion from fiscal year 2002 through fiscal year 2007.

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- *Fossil fuel programs.* Fossil fuel programs were appropriated \$3.1 billion in electricity-related R&D funding from fiscal year 2002 through fiscal year 2007. Appropriations for these programs were relatively constant during the 6-year period we examined. Appropriations totaled \$531 million in fiscal year 2002, peaked at \$574 million in fiscal year 2004, and then returned to \$531 million in fiscal year 2007. Most of the funding variation within these programs was due to the Clean Coal Power Initiative, which is aimed at accelerating the deployment of advanced technologies to reduce air emissions and other pollutants from coal-burning power plants. Funding for the Clean Coal Power Initiative decreased from \$210 million in fiscal year 2004 to \$62 million in fiscal year 2005, before increasing to \$75 million in fiscal year 2007. Other significant fossil fuel energy programs include the fuels and power systems program, which provides research funding aimed at reducing coal-burning power plant carbon emissions, and the FutureGen program, which focuses on the technical capability of coproducing electricity and hydrogen with near-zero emissions.
  - *Renewable programs.* Renewable programs were appropriated \$1.4 billion in electricity-related R&D funding from fiscal year 2002 through fiscal year 2007. During this period, appropriations for these programs grew by 23 percent, increasing from \$248 million in fiscal year 2002 to \$305 million in fiscal year 2007. Variations in funding were primarily attributable to funding for the Solar program, which makes up the largest share of renewable program funding. Here, funding more than doubled between fiscal year 2006 and 2007, rising from \$99 million to \$203 million. Other renewable energy programs include wind, biomass, and geothermal programs. The hydrogen R&D program was not included in our analysis as hydrogen primarily is used as an alternative fuel for transportation.

Based on our review of the Department of the Treasury (Treasury) estimates, the sum of revenue loss estimates associated with tax expenditures specifically related to electricity totaled \$18.2 billion from fiscal year 2002 to fiscal year 2007.<sup>3</sup> Over this period, revenue loss estimates associated with these tax expenditures increased by 88 percent,

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<sup>3</sup>Summing tax expenditure estimates provides a gauge of general magnitude but does not take into account interactions between individual provisions. Of the \$18.2 billion amount, we could assign \$16.5 billion to fuel types. We could not assign one electricity-related tax expenditure, deferral of gain from dispositions of transmission property, to a fuel type. This tax expenditure totaled \$1.7 billion during the period of our analysis. All tax expenditure estimates are based on projections using prior year data; whereas historical data are available for federal receipts and outlays, the last available values for tax expenditures remain estimates.

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growing from \$2.2 billion to \$4.1 billion annually. Electricity-related tax expenditures by type of fuel include the following:

- *Fossil fuels.* Fossil fuels received the largest share of electricity-related tax expenditures. We estimate that tax expenditures to support electricity production from fossil fuels totaled \$13.7 billion from fiscal year 2002 through fiscal year 2007. Revenue loss estimates associated with these tax expenditures grew by 43 percent during the 6-year period we reviewed, increasing from \$1.9 billion in fiscal year 2002 to \$2.7 billion in fiscal year 2007. These revenue loss estimates stemmed from 12 different tax expenditures. The largest tax expenditure supporting electricity production from fossil fuels was the alternative fuel production credit, which Treasury estimated at \$2.1 billion for fiscal year 2007.<sup>4</sup>
- *Renewables.* We estimate that tax expenditures to support electricity production from renewable sources totaled \$2.8 billion from fiscal year 2002 through fiscal year 2007. Revenue loss estimates associated with these tax expenditures grew by 232 percent during the 6-year period we reviewed, increasing from \$238 million in fiscal year 2002 to \$790 million in fiscal year 2007. These revenue loss estimates stemmed from three tax expenditures—Clean Renewable Energy Bond tax credits, exclusion of interest on energy facility bonds, and the new technology tax credit for renewable electricity production and renewable energy investment. The new technology credit, which reduces the cost of electricity generation from wind, geothermal, and solar energy, is the largest tax expenditure directed at renewable electricity production. Revenue loss estimates for this tax credit totaled \$690 million in fiscal year 2007.
- *Nuclear.* We did not identify tax expenditures directed at nuclear power production during the 6-year period we examined. A key tax expenditure directed at nuclear power production, the advanced nuclear power facilities production tax credit, was enacted in the 2005 Energy Policy Act. However, this tax credit has not been used because no nuclear power plant has been built recently.

As requested, we also identified a number of other potential federal government subsidies of electricity production. However, as discussed with your staff during our briefing, additional work would be required in

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<sup>4</sup>The tax credit for alternative fuel is scheduled to expire at the end of calendar year 2007. If this tax credit expires, the total tax expenditures for fossil fuels used for electricity production would fall significantly.

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order to determine the extent to which these activities are subsidies and to develop reasonable estimates. Among these:

- The federal government provides low-cost financing to federal power entities. For example, the power marketing administrations (PMA)<sup>5</sup> other than the Bonneville Power Administration (BPA) finance capital expenditures through federally appropriated debt. While PMAs repay appropriated debt to Treasury with interest, financing subsidies may exist if Treasury's cost of funds is greater than the interest rates on PMA-appropriated debt. Critics also have noted the rates, terms, and conditions of PMA debt may be preferential when compared to market rates, terms, and conditions.
- The Department of Agriculture's (USDA) Rural Utilities Service<sup>6</sup> provides loans and loan guarantees to rural electric cooperatives at low rates. Authorized amounts of these electricity loans and loan guarantees totaled \$21.9 billion from fiscal year 2002 to fiscal year 2006.
- The federal government, through the Price-Anderson Act, limits nuclear plant operator liability for accidents. This may be considered a subsidy because it could reduce insurance coverage needs and related insurance costs for nuclear plant operators.

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## Scope and Methodology

To estimate the federal funding DOE has received for electricity-related R&D, we conducted detailed reviews of DOE's R&D budget documents and included prior year balances and transfers from other agencies in our analysis, as well as funding for nuclear fusion energy, considered basic research by some. We also used Energy Information Administration (EIA) data on the types, amounts, and percentage of fuels used to produce electricity to estimate DOE's electricity-related R&D spending by fuel type. We discussed our allocation methodology with EIA officials.

To estimate the amount of tax expenditures the federal government provides to subsidize electricity production, we reviewed Treasury's tax expenditure data and identified specific electricity-related tax expenditures. We excluded broad tax expenditures available to most

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<sup>5</sup>The PMAs are BPA, Southeastern Power Administration, Southwestern Power Administration, and Western Area Power Administration.

<sup>6</sup>The Rural Utilities Service, an agency of USDA, will be referred to in this report as Rural Development.



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businesses. We used Treasury revenue loss estimates to determine the costs of these tax expenditures from fiscal year 2002 through fiscal year 2007. We also used EIA data on the types, amounts and percentage of fuels used to produce electricity to assign the electricity-related portion of these tax expenditure estimates by fuel type. We also reviewed our allocation methodology with EIA officials and staff in Treasury's Office of Tax Analysis.

To identify other ways the federal government subsidizes electricity, we reviewed relevant reports and studies prepared by GAO and other federal agencies including the Congressional Budget Office, the Congressional Research Service, and EIA. We reviewed studies by trade associations and nongovernmental groups. We interviewed relevant federal agency staff and other experts at trade associations and non-governmental groups. We conducted limited reviews of activities at the PMAs, the Tennessee Valley Authority, and USDA. In addition, we identified measures to calculate net federal financing support for loan and loan guarantee programs.

Several limitations apply to our review, including:

- We did not analyze subsidies related to electricity end use or consumption, such as those designed to promote energy efficiency and conservation or to provide low-income energy assistance.
- We did not gather data on possible electricity-related R&D funding by federal agencies other than DOE.
- We did not audit or verify data provided by agencies. We determined that DOE budget data were sufficiently reliable to provide useful information about the agency's electricity-related R&D funding.
- Although we present the tax expenditure estimates in aggregate and the sums are reliable as a gauge of general magnitude, they do not take into account interactions between individual provisions. We determined that Treasury's list of tax expenditures and revenue loss estimates were sufficiently reliable to provide perspective on electricity-related tax programs.
- We did not attempt to determine the market value of electricity-related subsidies.

We conducted this performance audit from April 2007 through September 2007 in accordance with generally accepted government auditing

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standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Agency Comments and Our Evaluation

We provided a draft of this report to the Department of Agriculture, the Department of Energy, the Department of the Treasury, the Nuclear Regulatory Commission, and the Tennessee Valley Authority for review and comment. We received technical comments from the Department of Agriculture, the Department of Energy, the Department of the Treasury and the Nuclear Regulatory Commission, which we incorporated as appropriate. We received written comments from the Department of Energy's Power Marketing Liaison Office, which represents the Southeastern Power Administration, Southwestern Power Administration, and Western Area Power Administration. These comments generally address methodologies used in previous GAO reports and technical comments on the briefing slides. These comments and our evaluation are in appendix II.

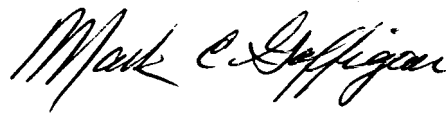
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We will send copies of this report to the appropriate congressional committees; interested Members of Congress; the Secretaries of Agriculture, Energy, and the Treasury; the Chairman of the Nuclear Regulatory Commission; the Tennessee Valley Authority's board of directors; and other interested parties. We also will make copies available to others on request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

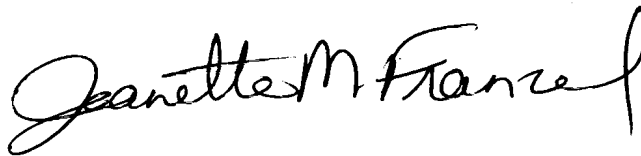
Should you or your staffs have any questions on the matters discussed in this report, please contact Mark Gaffigan at (202) 512-3841 or [gaffiganm@gao.gov](mailto:gaffiganm@gao.gov), or Jeanette Franzel at (202) 512-9406 or [franzelj@gao.gov](mailto:franzelj@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs can be found on the last page of this report.

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Mark Gaffigan  
Acting Director, Natural  
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# Appendix I: Briefing to the Senate Committee on Environment and Public Works

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## Federal Electricity Subsidies

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**Briefing to the Senate Committee on  
Environment and Public Works  
September 6, 2007**

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Note: Slides updated to reflect technical comments received by DOE, USDA and NRC in October 2007.

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## Background

Subsidies Represent the Provision of Benefits to a Group

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Subsidies are broadly defined as payments or benefits provided to encourage certain desired activities or behaviors.

In budget terms, subsidies are a payment or benefit made by the federal government where the benefit exceeds the cost to the beneficiary. Types of subsidies can include:

- Preferential provisions in the tax code (e.g., tax credits, deductions, special tax rates, or deferrals) referred to as tax expenditures.
- Provision of loans, goods, and services to the public at prices lower than market value. These include interest subsidies.<sup>1</sup>

Subsidies are often provided to implement federal policy, such as to encourage development or use of specific technologies.

In some cases, such as research and development (R&D), subsidies may be provided well in advance of desired activities or behaviors.

<sup>1</sup>GAO, *A Glossary of Terms Used in the Federal Budget Process*, GAO-05-734SP (Washington, D.C.: Sept. 2005).



## Background

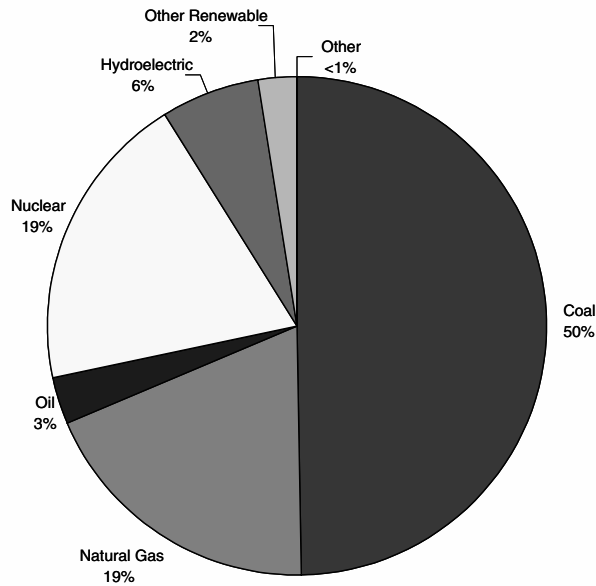
### Electricity Subsidies May Not Be Fuel Specific

Phase	Examples of federal subsidies
Fuel exploration and extraction	<ul style="list-style-type: none"> <li>•Tax treatment of geological and geophysical expenditures.</li> <li>•Capital gains treatment of royalties on coal.</li> </ul>
Power generation	<ul style="list-style-type: none"> <li>•Tax credits for renewable electricity production.</li> <li>•Department of Energy (DOE) R&amp;D funding on advanced generation technologies.</li> </ul>
Power transmission and distribution	<ul style="list-style-type: none"> <li>•USDA Rural Development loans and loan guarantees for capital expenses.</li> </ul>
End use	<ul style="list-style-type: none"> <li>•Tax credits for the purchase of energy efficient appliances.</li> <li>•DOE Weatherization Assistance Program.</li> </ul>
Environmental, health, and safety	<ul style="list-style-type: none"> <li>•Partial expensing for advanced mine safety equipment.</li> <li>•Liability limits for nuclear power plant accidents.</li> </ul>



## Background

### 2005 Generation Mix Dominated by Fossil Fuels and Nuclear

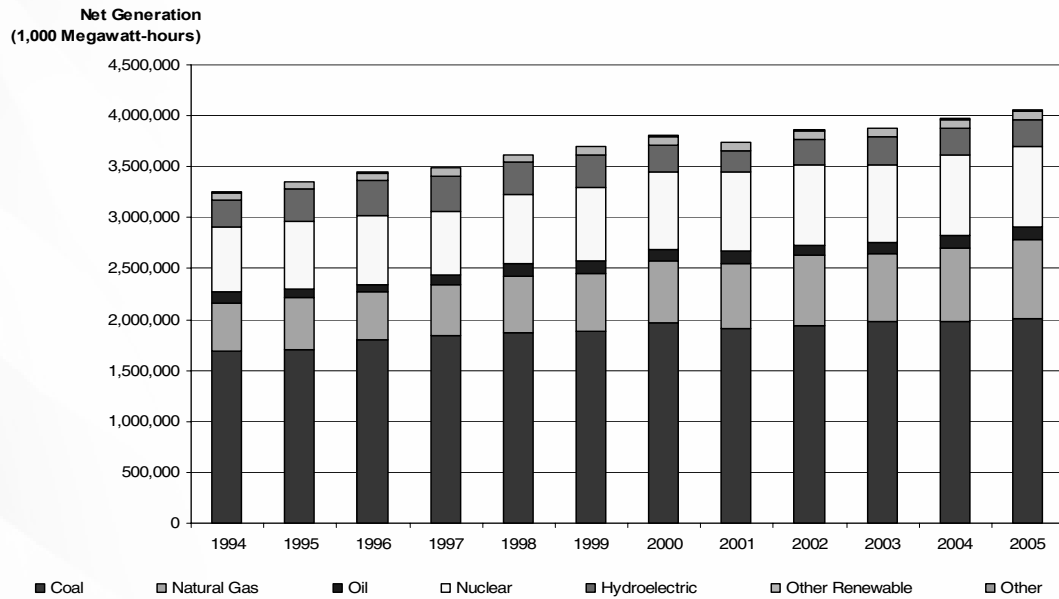


Source: GAO analysis of data provided by the Energy Information Administration.  
Note: Total individual slices may not total 100% due to individual rounding.



## Background

### Electricity Generation Continues to Rise



Source: GAO analysis of data provided by Energy Information Administration.





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## Objectives

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1. How much federal funding has DOE received for electricity-related R&D, including funding by type of fuel?
2. How much does the federal government provide in the form of tax expenditures to subsidize electricity, including tax expenditures by type of fuel?
3. In what other ways does the federal government subsidize electricity?



RIB

R&D

Tax

Other

6



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## Scope and Methodology

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Reviewed relevant reports and studies

- Prior GAO reports
- Federal agency reports (CBO, CRS, EIA)
- Studies by trade associations and nongovernmental groups

Interviewed key experts

- Federal agency staff (EIA, CBO, CRS, BPA, Treasury, TVA, USDA, NRC)
- Experts at key trade associations and nongovernmental groups

Conducted detailed reviews of

- DOE R&D budgets
- Treasury tax expenditure data

Developed estimates of how much of the subsidies were electricity-related based on EIA data.

Conducted limited reviews of activities at PMAs, TVA, and USDA.

Identified measures to calculate net federal financing support for:

- Loan and loan guarantee programs and federal power programs
- Subsidies stemming from programs and laws related to nuclear power

Consulted with EIA on related ongoing work (expected November 2007).

All amounts reported are adjusted for inflation utilizing 2007 as the base year.

Our work was completed from April 2007 through September 2007 according to generally accepted government auditing standards.



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## Limitations

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We analyzed federal electricity subsidies from fiscal year 2002 to fiscal year 2007, and our analysis does not include subsidies before fiscal year 2002 or projected to occur after fiscal year 2007.

We did not analyze subsidies related to electricity end use or consumption such as energy efficiency, conservation, and low-income energy assistance in the scope of our work.

Due to limited time frame, we did not gather data on possible electricity-related R&D funding by federal agencies other than DOE.

- Department of Defense, the National Aeronautics and Space Administration, and the Department of Commerce

Our R&D funding analysis included prior year balances and transfers from other agencies noted in DOE appropriation documents.

We also included DOE R&D funding for fusion energy, considered basic research by some, under nuclear power.

Where data were available, we analyzed federal electricity subsidies based on the cost to the federal government to provide them. We did not attempt to determine the market value of subsidies.



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## Limitations

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We did not audit or verify data provided by the agencies. We determined that DOE budget data were sufficiently reliable to provide useful information about the agency's electricity-related R&D funding.

Although we present tax expenditure estimates in the aggregate and the sums are reliable as a gauge of general magnitude, they do not take into account interactions between individual provisions. As a rule, we excluded broad tax expenditures available to most businesses.

We did not evaluate whether subsidies occur in federal policies such as the royalty treatment of resource extraction on federal land, charges for the use of federally-owned resources (such as land that is used for hydropower generation), and differential treatment of electric power generation plants with respect to pollution control. We also did not review possible subsidies related to trust fund liabilities of several funds, such as the Abandoned Mine Reclamation Fund and the Black Lung Liability Fund. (See GAO, *Renewable Energy: Wind Power's Contribution to Electric Power Generation and Impact on Farms and Communities*, GAO-04-756 (Washington, D.C.: Sept. 3, 2004) for a fuller discussion of the potential hidden subsidies stemming from environmental and health costs.)



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## Results in Brief

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For electricity-related R&D, we estimate

- DOE received \$11.5 billion (2007 dollars) in funding from FY2002 to FY2007.
- Funding grew by 35 percent from FY2002 to FY2007.
- Funding spread across several fuels: about \$6.2 billion was provided to nuclear, \$3.1 billion to fossil fuels, and \$1.4 billion to renewables.

For electricity-related tax expenditures, we estimate

- Tax expenditures totaled \$18.2 billion (2007 dollars) from FY2002 to FY2007.
- Grew by 88 percent from FY2002 to FY2007.
- Tax expenditures largely go to fossil fuels: about \$13.7 billion was provided to fossil fuels and \$2.8 billion to renewables.
- We did not include the credit for production from advanced nuclear power facilities because there is no current revenue loss from the credit as advanced nuclear facilities have yet to be constructed.

Federal loan and loan guarantees, preferred borrowing, and other activities may also subsidize electricity.



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## Research and Development

DOE Electricity-Related R&D Funding Totals \$11.5 Billion (2007 dollars) from FY2002 to FY2007 and Increased by About 35% over this Period

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We estimate that DOE electricity-related R&D funding totaled \$11.5 billion from FY2002 to FY2007.

- Nuclear: \$6.2 billion
- Fossil Fuels: \$3.1 billion
- Renewables: \$1.4 billion
- Transmission: \$0.7 billion

(Amounts for nuclear, fossil fuels, renewables and transmission do not add up to \$11.5 billion due to rounding.)

R&D funding across all fuel types increased by 35% from FY2002 through FY2007, from \$1.6 billion to \$2.2 billion, respectively.

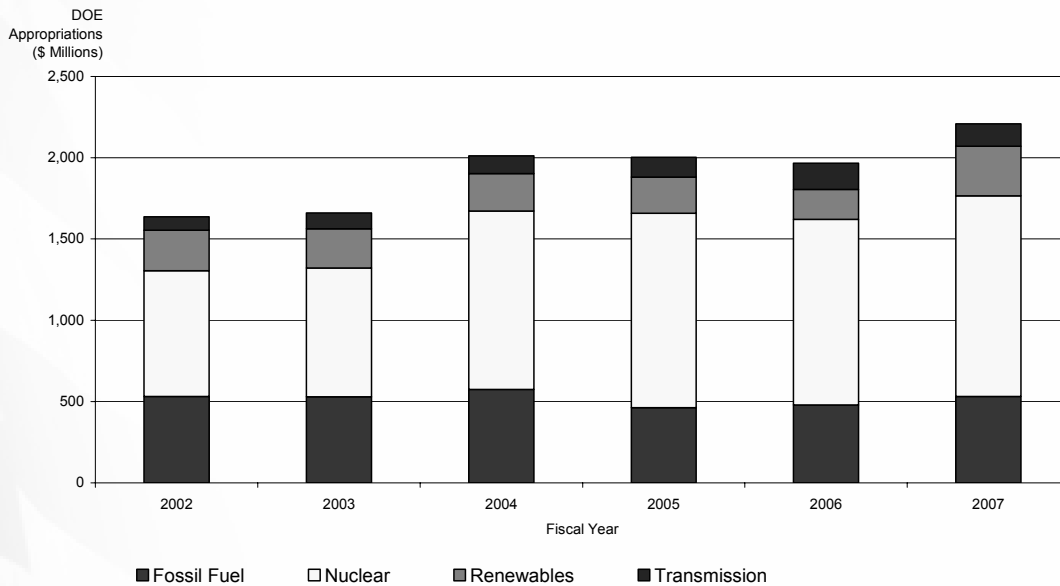
- Nuclear: \$775 million to \$1,235 million (59% increase)
- Fossil Fuel: \$531 million in 2002 and 2007 (0% increase)
- Renewable: \$248 million to \$305 million (23% increase)<sup>2</sup>
  - Solar: increased from \$126 million to \$203 million (60% increase)
  - Geothermal: decreased from \$36 million to \$6 million (84% decrease)

<sup>2</sup>Funding for hydrogen increased 154%; however, this fuel type was not allocated to electricity since it is used primarily as an alternative fuel for transportation.



## Research and Development

DOE Funding for Electricity-Related R&D Increased 35% from FY2002 to FY2007 (in 2007 dollars)



Source: GAO analysis of data provided by DOE.



## Research and Development

DOE Electricity-Related Funding Varied Widely across Fuels in FY2007

Fuel Sources and Transmission	Types of Fuels	Total Energy Subsidies (\$ Millions) <sup>a</sup>	Percent Used for Electricity	Net Electricity Subsidies (\$ Millions)	Electricity Generation - Megawatt-Hours
<b>Fossil</b>	Coal	\$572.8	91.9%	\$526.5	1,955.7
	Oil	3.6	2.3%	0.1	98.7
	Natural Gas	16.1	25.4%	4.1	643.6
<b>Nuclear</b>	Nuclear	1,235.3	100.0%	1,235.3	780.3
<b>Renewable</b>	Hydrogen	246.1	0.0%	0.0	0.0
	Biomass	253.9	13.3%	33.9	23.3
	Solar	202.6	100.0%	202.6	0.6
	Wind	62.7	100.0%	62.7	15.9
	Geothermal	6.4	91.0%	5.8	14.6
	Hydropower	0.0	98.7%	0.0	269.9
<b>Transmission</b>	All Above	137.0	100.0%	137.0	--
<b>Total</b>		<b>\$2,736.6</b>		<b>\$2,208.0</b>	

Sources: DOE Fiscal Year 2007 Operating Plan and EIA Annual Energy Review 2006.

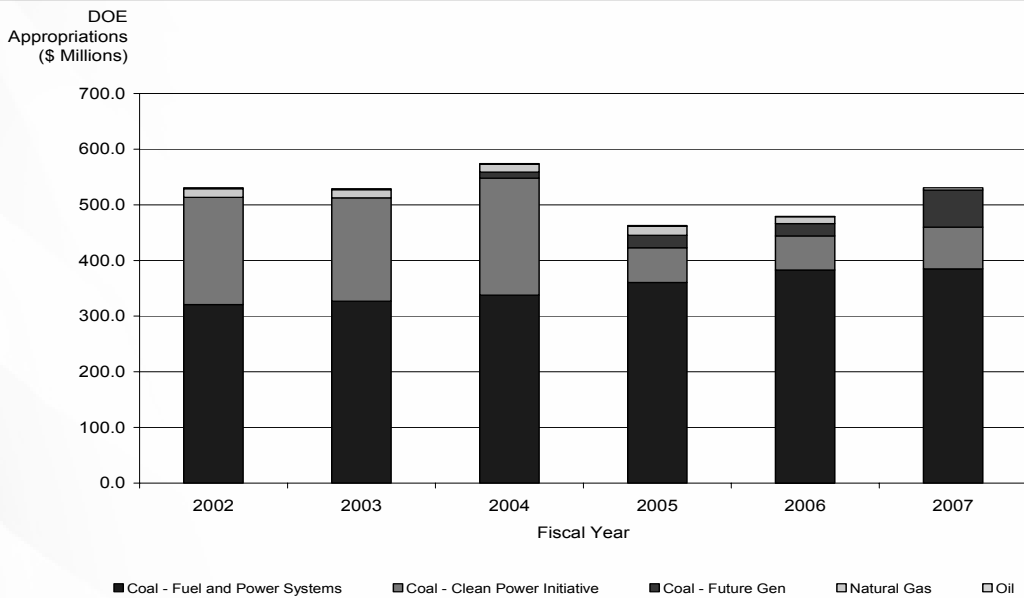
<sup>a</sup>Program management allocated on a pro rata basis to individual fuel types.





## Research and Development

DOE Funding for Electricity-Related Fossil Fuel R&D Varied Slightly  
from FY2002 to FY2007 (2007 dollars)



Source: GAO analysis of data provided by DOE.



## Research and Development

### DOE Funding for Electricity-Related Fossil Fuels R&D Programs in FY2007

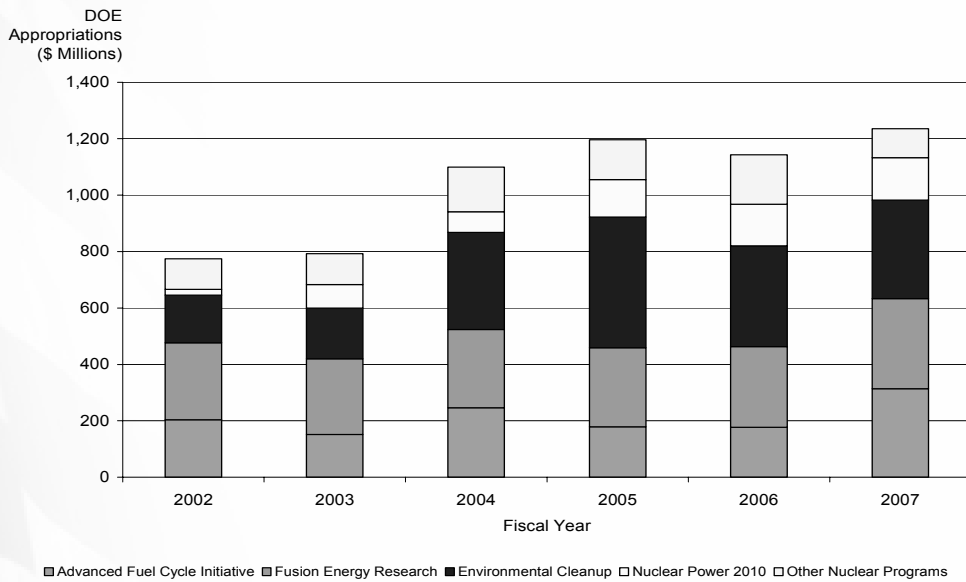
Fuel Type	Program	Description	FY2007 (\$ Millions)
<b>Coal</b>	Fuels and Power Systems	Provides research to reduce coal power plant emissions and improve efficiency to reduce carbon emissions.	\$385.0
	Clean Coal Power Initiative	Enables and accelerates deployment of advanced technologies to ensure that the United States has clean, reliable, and affordable electricity.	74.7
	FutureGen	Focuses on the technical capability of coproducing electricity and hydrogen with near-zero atmospheric emissions.	66.8
<b>Natural Gas</b>	Natural Gas Technologies	Develop technologies to locate and produce gas from nonconventional reservoirs	4.1
<b>Oil</b>	Oil Technologies	Develop technologies to resolve the environmental, supply, and reliability constraints of producing oil resources.	0.1
<b>Total Fossil Fuel</b>			<b>\$530.7</b>

Source: GAO analysis of data provided by DOE.



## Research and Development

DOE Funding for Electricity-Related Nuclear R&D Increased from  
FY2002 to FY2007 (2007 dollars)



Source: GAO analysis of data provided by DOE.



## Research and Development

### DOE Funding for Electricity-Related Nuclear R&D Programs in FY2007

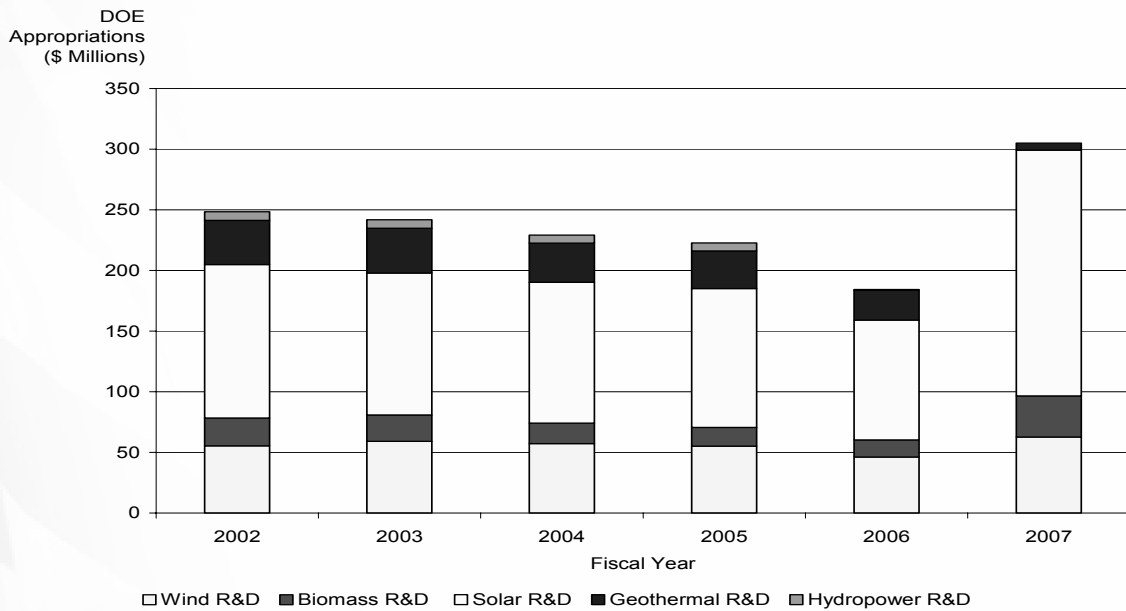
Fuel Type	Program	Description	FY2007 (\$ Millions)
<b>Nuclear Energy</b>	Environmental Cleanup	Complete the safe clean up of the environmental legacy of five decades of nuclear energy research.	\$349.7
	Fusion Energy Research	National research effort to advance the knowledge base needed for an economic and environmentally attractive fusion energy source.	319.0
	Advanced Fuel Cycle Initiative	Focuses on the reduction of nuclear fuel waste needing geologic disposal and the recovery of spent nuclear fuel energy.	313.6
	Nuclear Power 2010	Joint government/industry effort to identify sites for new nuclear power plants, develop advanced standardized nuclear plant designs, and evaluate the business case for building new nuclear power plants.	150.4
	Other Nuclear Programs	Includes Generation IV Nuclear Energy Systems Initiative and the Nuclear Hydrogen Initiative.	102.7
<b>Total Nuclear</b>			<b>\$1,235.3</b>

Source: GAO analysis of data provided by DOE.



## Research and Development

DOE Funding for Electricity-Related Renewable R&D Decreased until FY2007 (2007 dollars)



Source: GAO analysis of data provided by DOE.



## Research and Development

### DOE Funding for Electricity-Related Renewable R&D Programs in FY2007

Fuel Type	Program	Description	FY2007 (\$ Millions)
Renewable	Solar	Develop and accelerate the widespread commercialization of clean solar energy technologies.	\$202.6
	Wind	Improve wind energy technology and address barriers to the use of wind energy.	62.7
	Biomass	Develop technologies for the successful deployment of refineries utilizing biomass resources (plant-derived material).	33.9
	Geothermal	Develop the economic production of geothermal systems and conduct field verification tests of new technology.	5.8
	Hydropower	Develop advanced technology to enhance environmental performance and operational efficiency.	0.0
<b>Total Renewable</b>			<b>\$305.0</b>

Source: GAO analysis of data provided by DOE.



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## Tax Expenditures

Tax Expenditures are Large and Growing Support Provided to Electricity Production

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We estimate electricity-related tax expenditures totaled \$18.2 billion from FY2002 to FY2007 (2007 dollars).<sup>3</sup>

- \$13.7 billion for fossil fuels
- \$2.8 billion for renewables
- \$1.7 billion for transmission
- None assigned to nuclear

Electricity-related tax expenditures increased from \$2.2 billion to \$4.1 billion (2007 dollars) from FY2002 to FY2007.

- Fossil fuels: \$1.9 billion to \$2.7 billion (43% increase)
- Renewables: \$238 million to \$790 million (232% increase)

Many tax expenditures applied to multiple fuels.

- We made assignments to fuels based, in part, on EIA data.

Many electricity-related tax expenditures created since 2005, others extended or expanded.

<sup>3</sup>Summing tax expenditures does not take into account interactions between individual provisions.



## Tax Expenditures

Several Key Tax Expenditures Apply to Multiple Fuels

Tax expenditure	Eligible fuels
New technology credit (credit for renewable electricity production and credit for renewable energy investment <sup>4</sup> )	Wind, biomass, poultry waste, geothermal, solar, small irrigation power, municipal solid waste, hydropower, refined coal, and Indian coal, plus fuel cells and microturbines.
Alternative fuel production credit	Synthetic fuels produced from coal and gas produced from biomass.
Clean Renewable Energy Bond credit (CREBs)	Projects may include wind facilities, closed and open loop biomass facilities, geothermal or solar facilities, small irrigation power facilities, landfill gas facilities, trash combustion facilities, refined coal production facilities, and certain hydropower facilities.

<sup>4</sup>The new technology credit includes both a tax credit for production of electricity from renewable fuels and a tax credit for business investment in renewable fuel energy equipment. Currently, 10 renewable fuels and 2 renewable fuel technologies are eligible for the credit. We were unable to identify sufficient criteria to allocate revenue loss estimates for the credit to the specific fuels and technologies. Three fuels—wind, geothermal, and solar energy—likely receive the bulk of the credit.

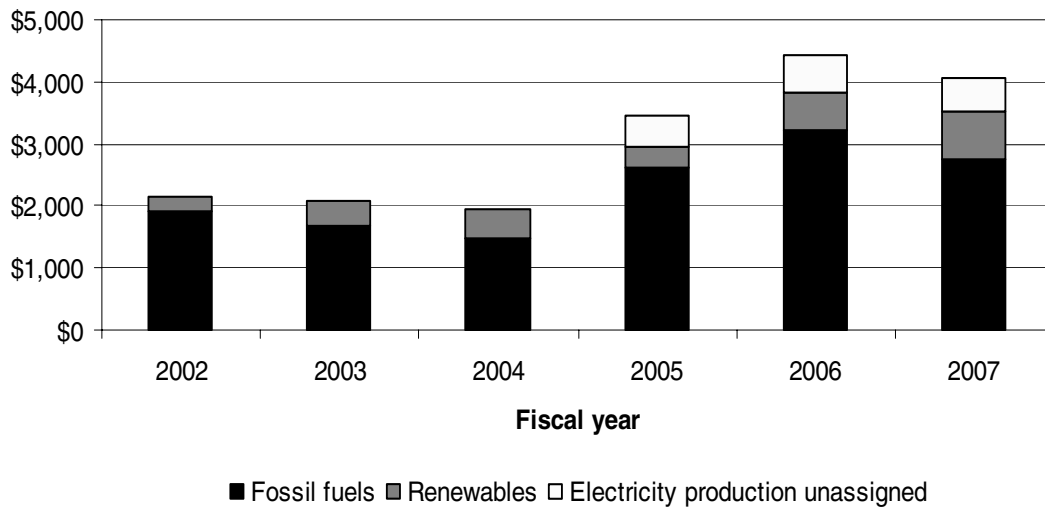




## Tax Expenditures

Electricity-Related Tax Expenditures Increased from \$2.2 billion to \$4.1 Billion from FY2002 to FY2007 (2007 dollars)

Dollars in millions (in constant 2007 dollars)



Source: GAO analysis of tax expenditure data in OMB budget reports for fiscal years 2004-2008.

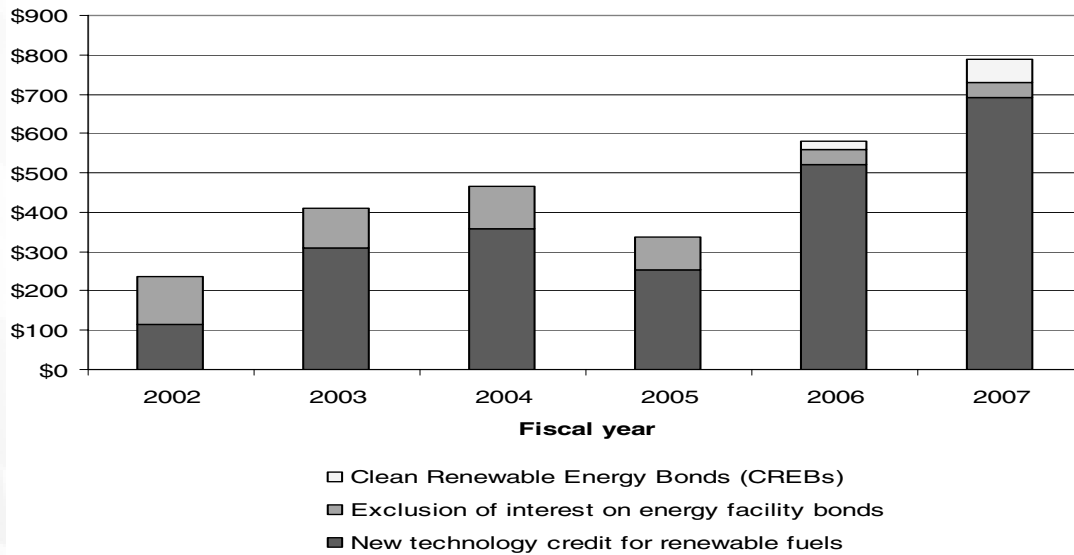
Note: Summing tax expenditure estimates does not take into account interactions between individual provisions.



## Tax Expenditures

Electricity-related Tax Expenditures for Renewable Fuels Grew from \$238 million to \$790 million from FY2002 to FY2007 (2007 dollars)

Dollars in millions (in constant 2007 dollars)



Source: GAO analysis of tax expenditure data in OMB budget reports for fiscal years 2004-2008.

Note: Summing tax expenditure estimates does not take into account interactions between individual provisions.



## Tax Expenditures

Most CREBs Set to Finance Solar and Wind Projects

### Borrowers and Projects Receiving Initial CREB Volume Cap Allocations

Borrower	Type of project						Total
	Solar	Wind	Landfill gas	Open-loop biomass	Hydropower	Refined coal production	
<b>Governmental</b>	401	99	23	1	8	0	<b>532</b>
<b>Cooperative</b>	33	13	13	12	6	1	<b>78</b>
<b>Total</b>	<b>434</b>	<b>112</b>	<b>36</b>	<b>13</b>	<b>14</b>	<b>1</b>	<b>610</b>

Source: Internal Revenue Service.

Note: The national limit on CREBs is \$1.2 billion of which a maximum of \$750 million can be granted to governmental bodies.



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## Tax Expenditures

### Clean Renewable Energy Bonds (CREBs) Provide Financing for Renewable Energy Projects

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The Energy Policy Act of 2005 (Pub. L. No. 109-58) authorized Treasury to allocate an \$800 million volume cap in tax credit bonds to fund projects that can generate clean renewable energy.

Electric cooperatives and state and local governmental bodies have the ability to issue CREBs.

In November 2006, IRS reported that 610 projects for state and local governmental and electrical cooperative borrowers will receive authority to issue tax credit bonds under the CREBs program.

The Tax Relief and Health Care Act of 2006 (Pub. L. No. 109-432) increased the volume cap for CREBs to \$1.2 billion and extended the program until December 31, 2008.

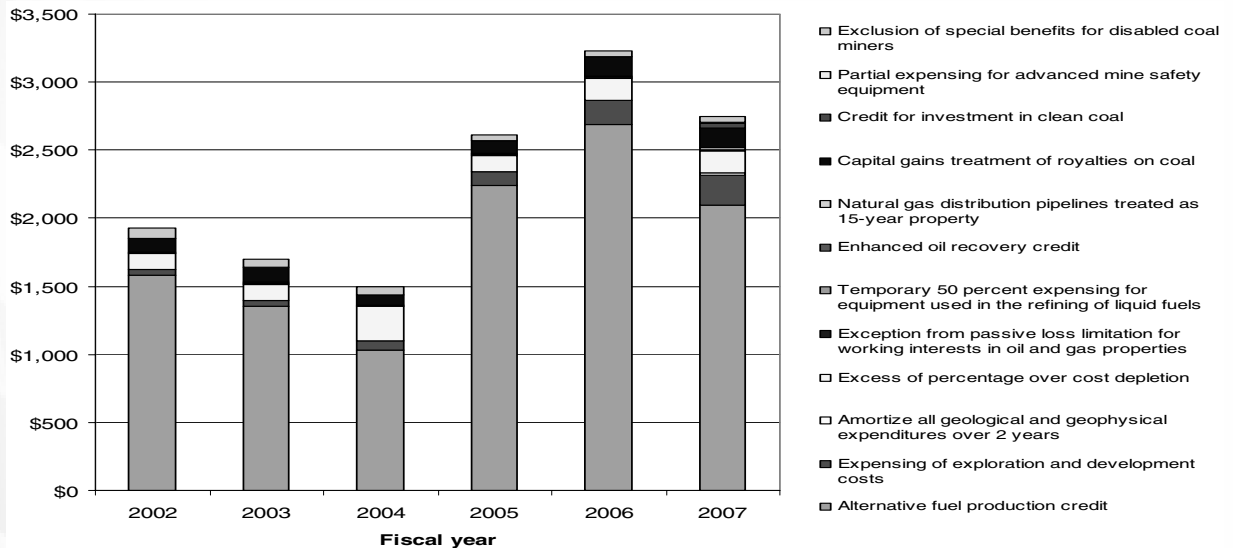
Tax credit bonds provide a greater subsidy than state and local government tax-exempt (municipal) bonds because the issuer does not pay interest.



## Tax Expenditures

Electricity-related Tax Expenditures for Fossil Fuels Grew from \$1.9 billion to over \$2.7 billion from FY2002 to FY2007 (2007 dollars)

Dollars in millions (in constant 2007 dollars)



Source: GAO analysis of tax expenditure data in OMB budget reports for fiscal years 2004-2008.

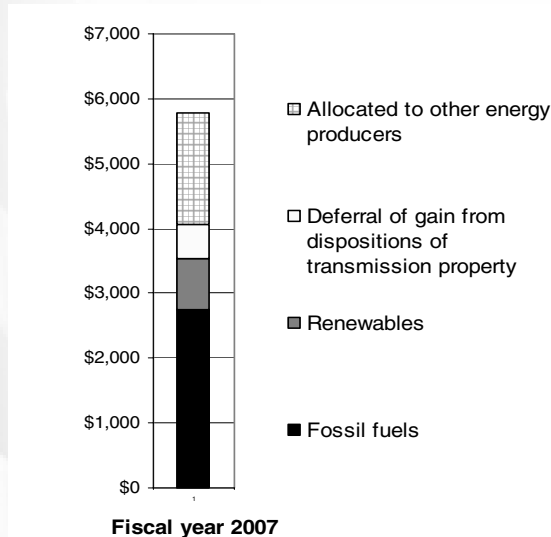
Note: Summing tax expenditure estimates does not take into account interactions between individual provisions.



## Tax Expenditures

### Tax Expenditures for Fuels Used for Electricity Production, FY2007

Dollars in millions



For fiscal year 2007, we identified 15 tax expenditures available to electricity producers, with revenue losses totaling \$5.8 billion.

We allocated \$3.5 billion of these tax expenditures to specific fuel sources used to produce electricity (\$2.7 billion for fossil fuels and \$0.8 billion for renewables) based on EIA data.

Deferral of gain from dispositions of transmission property (\$0.5 billion in revenue losses) benefits electricity producers, but we could not allocate to specific fuel sources.

The remaining \$1.7 billion we could not assign to electricity producers or their fuel choices.

Source: GAO analysis of tax expenditure data in OMB budget reports for fiscal years 2004-2008.

Note: Summing tax expenditure estimates does not take into account interactions between individual provisions.



## Tax Expenditures

### FY2007 Electricity-Related Tax Expenditure Estimates

Tax expenditure related to electricity production in fiscal year 2007	Total tax expenditure estimate	Assigned to electricity
Credit for holding clean renewable energy bonds (CREBs)	\$60	\$60
Credit for investment in clean coal (power generation) facilities	30	27
Credit for alternative fuel production	2,370	2,095
Exclusion of interest on energy facility bonds	40	40
New technology credit	690	690
Amortize all geological and geophysical expenditures over 2 years	60	16
Exception from passive loss limitation for working interests in oil and gas properties	30	6
Excess of percentage over cost depletion, fuels	790	160
Expensing of exploration and development costs, fuels	860	224
Natural gas distribution pipelines treated as 15-year property	50	15
Partial expensing for advanced mine safety equipment	10	9
Exclusion of special benefits for disabled coal miners	50	44
Capital gains treatment of royalties on coal	170	150
Temporary 50% expensing for equipment used in the refining of liquid fuels	30	1
Deferral of gain from dispositions of transmission property to implement Federal Energy Regulatory Commission (FERC) restructuring policy	530	530
<b>Sum of tax expenditure revenue loss estimates</b>	<b>\$5,770</b>	<b>\$4,067</b>

Source: GAO analysis of tax expenditure data in OMB budget report for fiscal year 2008.

Note: Summing tax expenditure estimates does not take into account interactions between individual provisions.



## Tax Expenditures

### FY2007 Electricity-Related Tax Expenditure Estimates by Fuel Source

Tax expenditure related to electricity production in fiscal year 2007	Assigned to electricity			
	Fossil fuel	Renewables	Not assigned	Estimate sum
Credit for holding clean renewable energy bonds (CREBs)	\$0	\$60	\$0	\$60
Credit for investment in clean coal (power generation) facilities	27	0	0	27
Credit for alternative fuel production	2,095	0	0	2,095
Exclusion of interest on energy facility bonds	0	40	0	40
New technology credit	0	690	0	690
Amortize all geological and geophysical expenditures over 2 years	16	0	0	16
Exception from passive loss limitation for working interests in oil and gas properties	6	0	0	6
Excess of percentage over cost depletion, fuels	160	0	0	160
Expensing of exploration and development costs, fuels	224	0	0	224
Natural gas distribution pipelines treated as 15-year property	15	0	0	15
Partial expensing for advanced mine safety equipment	9	0	0	9
Exclusion of special benefits for disabled coal miners	44	0	0	44
Capital gains treatment of royalties on coal	150	0	0	150
Temporary 50% expensing for equipment used in the refining of liquid fuels	1	0	0	1
Deferral of gain from dispositions of transmission property to implement FERC restructuring policy	0	0	530	530
<b>Sum of tax expenditure revenue loss estimates</b>	<b>\$2,747</b>	<b>\$790</b>	<b>\$530</b>	<b>\$4,067</b>

Source: GAO analysis of tax expenditure data in OMB budget report for fiscal year 2008.

Note: Summing tax expenditure estimates does not take into account interactions between individual provisions.





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## Tax Expenditures

GAO Recommended Examining Tax Expenditures alongside Related Spending and Reevaluating the Energy R&D Funding Mix

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GAO has recommended that tax expenditures be considered alongside related spending programs in performance reviews and recommended developing a framework for evaluating tax expenditures.<sup>5</sup>

Review of major programs and policies, including tax expenditures, can help establish their relevance to today's needs, and direct scarce resources to the most effective tools to deliver federal support.

GAO has suggested that Congress consider focusing more of the R&D funding mix on advanced energy technologies.<sup>6</sup>

<sup>5</sup>GAO, *Government Performance and Accountability: Tax Expenditures Represent a Substantial Federal Commitment and Need to Be Reexamined*, GAO-05-690 (Washington, D.C.: Sept. 23, 2005).

<sup>6</sup>GAO, *Department of Energy: Key Challenges Remain for Developing and Deploying Advanced Energy Technologies to Meet Future Needs*, GAO-07-106 (Washington, D.C.: Dec. 20, 2006).



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## Tax Expenditures

### GAO Recommends Examining Tax Expenditures alongside Related Spending and Reevaluating the Energy R&D Funding Mix

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For biofuels,<sup>7</sup> GAO recommended that DOE

- Develop a strategic approach to coordinate a range of production and distribution programs and policies
- Collaborate with Treasury in evaluating the extent to which biofuel-related tax expenditures are achieving their goals

A number of electricity-related tax expenditures enacted or expanded in 2005 are set to expire in coming years.

Congressional review prior to expiration could offer an opportunity to examine the results and consider which to keep, modify, or eliminate.

- Examine alongside related program funding.
- Examine coordination between DOE and Treasury.

<sup>7</sup>GAO, *Biofuels: DOE Lacks a Strategic Approach to Coordinate Increasing Production with Infrastructure Development and Vehicle Needs*, GAO-07-713 (Washington, D.C.: June 8, 2007).



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## Other Ways the Federal Government May Subsidize Electricity

GAO Identified Specific Areas that Would Require Additional Work to Evaluate

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1. Federal government provides some federal electricity producers with access to low-cost financing
2. USDA Rural Development loans money to some electricity producers and sellers at low interest rates
3. New program at DOE could expand loan guarantees for renewables and nuclear
4. USDA electricity-related programs support electricity
5. DOE's Tribal Energy Activities Program and Renewable Energy Production Incentives Program encourage development of renewable energy sources
6. Price-Anderson Act limits nuclear operator liability
7. Decontamination and decommissioning of nuclear fuel manufacturing facilities may result in federal costs
8. Construction and operation of commercial nuclear reactor waste storage may result in federal costs



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## Other Ways the Federal Government May Subsidize Electricity

### Federal Government Provides Low-Cost Financing to Federal Electricity Producers

Federal entities have access to low-cost financing.

- Power marketing administrations (PMAs) other than the Bonneville Power Administration (BPA) finance capital expenditures through federally appropriated debt repaid at various terms.
- BPA is responsible for repaying previously appropriated debt, federal borrowing, and nonfederal debt related to several capital expenditures.
  - Columbia River Power System
  - Corps of Engineers fish-related investment
  - BPA transmission investments made prior to 1978
  - Corps of Engineers and Bureau of Reclamation hydroelectric improvements
- The Tennessee Valley Authority finances capital expenditures through privately issued bonds that are highly rated due to perceived federal guarantee (despite notation on bonds).

Low cost of borrowing may amount to a subsidy.

- Critics have noted these rates, terms, and conditions may be preferential compared to market rates, terms, and conditions.

Methodologies to measure subsidies can produce a range of results.

More work could be done:

- Detailed comparison of rates, terms and conditions
- Identification of appropriate comparison group



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## Other Ways the Federal Government May Subsidize Electricity

### PMA and BPA Borrowing May Constitute a Subsidy

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PMAs and BPA use appropriated debt.

- PMAs other than BPA receive appropriations for capital expenditures (called appropriated debt).
- Western Area Power Administration (WAPA), Southeastern Power Administration (SEPA), and Southwestern Power Administration (SWPA) use appropriated debt.
- BPA repays previously appropriated debt and uses other federal borrowing.
  - In FY1997, BPA's appropriated debt was restructured from \$6.85 billion, with an average interest rate of 3.5 percent, to \$4.1 billion, with an interest rate of 7.1 percent.
  - BPA estimated the present value of the principal after restructuring increased by \$100 million.
  - BPA also uses direct federal borrowing and acquires some capital assets via private sector lease.

Appropriated debt must be repaid with interest and outstanding appropriated debt may constitute a subsidy.

- A net financing cost can exist if PMA interest rates are below Treasury rates.
- As of September 30, 2006, weighted average interest rates for outstanding appropriated debt are:
  - SEPA 4.7%
  - SWPA 3.2%
  - WAPA 5.5%
  - BPA 6.7%



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## Other Ways the Federal Government May Subsidize Electricity

TVA's Implicit Federal Guarantees on Borrowed Funds May Reduce  
Borrowing Costs and Amount to a Subsidy

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TVA borrows from private debt markets.

- TVA is authorized to issue bonds and notes in private markets.
- Authority to issue bonds and notes is set by Congress and currently cannot exceed \$30 billion outstanding at any given time.

TVA bonds are highly rated due, in part, to perceived federal backing.

- Debt rating services (Standard and Poor's, Moody's, Fitch) give TVA credit their highest ratings.
- According to Standard and Poor's, TVA's rating "reflects the U.S. government's implicit support of TVA due to its status as a wholly owned government corporation, despite the lack of a binding legal obligation, as well as the authority's underlying business and financial risk."



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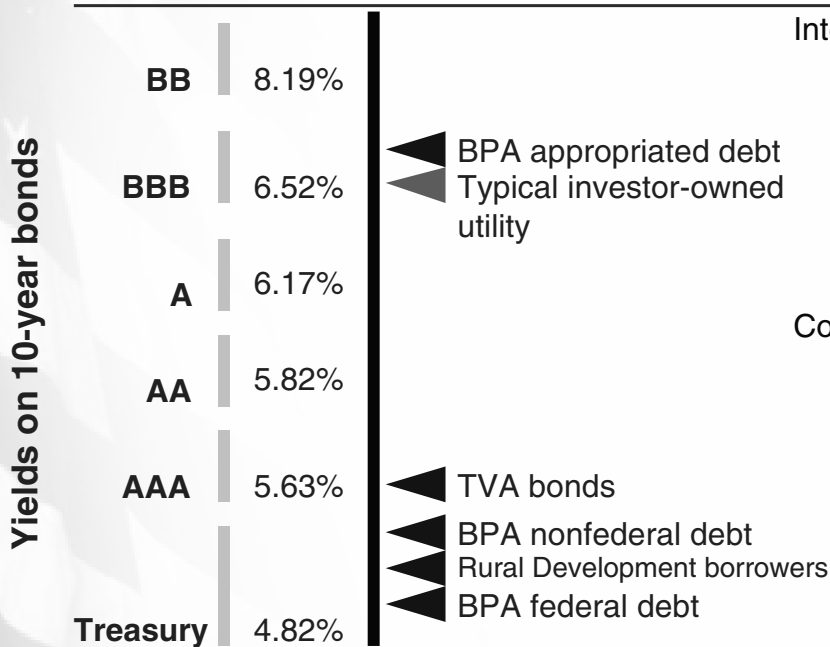
Other

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## Other Ways the Federal Government May Subsidize Electricity

Federal Debt Generally Pays Favorable Rates Relative to Private Debt Ratings



Interest rates on federal borrowing vary:

- BPA rates vary from 5.1% to 6.7% (average rates on all outstanding debt at the end of FY06 for bonds and appropriations, respectively)
- TVA debt is rated AAA or equivalent.
- PMAs (SEPA, SWPA, WAPA) ranged from 3.2% to 5.5% in FY2006.

Comparison group varies

- Many investor-owned utilities carry debt ratings in the BBB+ to BBB range

Note: Yields on 10-year U.S. Treasury and corporate utility bonds for July 30, 2007. Table compares current 10-year rates for Treasury bonds and utility debt with average interest rates for PMAs, which includes debt issued in many different years. IOU interest expense is tax deductible and this can lower their cost of borrowing. Source: Reuters Pricing Service and Bondsonline.com.



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## Other Ways the Federal Government May Subsidize Electricity

USDA Rural Development Lends Money to Some Electricity Producers and Sellers at Low Interest Rates

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USDA Rural Development provides loans and loan guarantees to rural electric cooperatives at low rates.

- Cooperatives generally serve areas that are historically rural, but may now include some portions of highly populated metropolitan areas.

Rural Development loans may provide a subsidy.

- Rural Development interest rates may be lower than market rates.
- Rural Development loan defaults could end up costing the federal government money.

Rural Development provides an estimate of the subsidy associated with its loans.

- GAO has not done recent work to review Rural Development estimates or otherwise evaluate potential subsidies.

More work is needed to develop robust estimates of potential subsidies.

- Detailed comparison of rates, terms, and conditions of Rural Development loans to those available to comparable entities.
- Identification of appropriate comparable entities.



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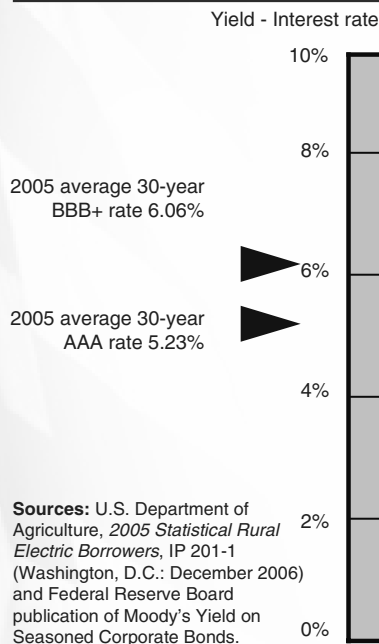
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## USDA Rural Development

Rural Development Provides Loans Directly and Guarantees Loans Made by Others



Rural Development makes three types of direct loans for electricity purposes:

- Hardship rate loans offered at a 5% interest rate
- Municipal rate loans offered at interest rates available in the municipal bond market for similar maturities (from 3.625% to 4.250% for third quarter 2007)
- Treasury rate loans at interest rates established daily by the United States Treasury (from 4.31% to 4.88% as of August 27, 2007)

Rural Development guarantees loans made by others:

- Treasury's Federal Financing Bank
- National Rural Utilities Cooperative Finance Corporation
- National Bank for Cooperatives



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## USDA Rural Development

### Estimated Subsidy Costs of Loans and Loan Guarantees

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Authorized amounts of Rural Development electricity loan and loan guarantee totaled \$21.9 billion from FY2002 to FY2006.

- Loan disbursements from these authorized funds total \$14.9 billion, according to the most recent USDA estimates.
- Current estimate of the subsidy cost for the disbursed portion of these loan and loan guarantees are \$2.4 million.

Sources: USDA and the Federal Credit Supplement and Appendix to the Administration's Fiscal Year 2007 and 2008 Budgets.



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## Other Ways the Federal Government May Subsidize Electricity

New Program at DOE Could Expand Loan Guarantees for Renewables and Nuclear

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### Incentives for Innovative Technologies Loan Guarantee Program

- Authorized by the 2005 Energy Policy Act.

DOE has yet to fund projects under this program.

- Potentially eligible projects include renewable energy systems and advanced nuclear energy facilities.
- For fiscal year 2007, Congress provided DOE with authority to issue guarantees for up to \$4 billion in loans.
- For fiscal year 2008, DOE requested \$9 billion in loan guarantee authority.

GAO is required to annually review the status of this program.



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## Other Ways the Federal Government May Subsidize Electricity

### Other USDA Programs Support Electricity

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The Farm Security and Rural Investment Act of 2002 added or augmented several provisions to support renewable energy, such as wind power's growth, including

- Conservation Reserve Program
- Business and Industry Direct Loan and Loan Guarantee Program
- Value-Added Agriculture Product Market Development Grants
- Energy Audit and Renewable Energy Development Program
- Renewable Energy Systems and Energy Efficiency Improvements

We reported in September 2004<sup>8</sup> that many USDA stakeholders considered the Renewable Energy Program the key USDA program for promoting renewable energy sources on farms, ranches, or other rural lands.

<sup>8</sup>GAO, *Renewable Energy: Wind Power's Contribution to Electric Power Generation and Impact on Farms and Rural Communities*, GAO-04-756 (Washington, D.C.: Sept. 3, 2004).



## USDA Renewable Energy Program

Dollar Amounts of Grants Offered and Loans Guaranteed, FY2003 to FY2006

Renewable technology	Fiscal year				FY02-06 total
	2003	2004	2005	2006	
<b>Grant program</b>					
Wind	\$7,388,903	\$7,886,830	\$12,533,783	\$5,417,525	\$33,277,041
Biomass-anaerobic digester	7,446,530	9,508,946	5,018,017	2,880,957	24,854,450
Biomass-bioenergy	2,529,005	3,133,844	2,118,391	6,993,218	14,774,458
Energy efficiency	1,504,252	1,815,262	1,610,429	4,512,936	9,442,879
Hybrid systems	2,112,977	126,992	199,863	81,404	2,521,236
Solar	725,566	54,822	661,855	782,396	2,224,639
Geothermal	0	285,353	94,930	540,999	921,282
<b>Grant program total</b>	<b>\$21,707,233</b>	<b>\$22,812,049</b>	<b>\$22,237,268</b>	<b>\$21,209,435</b>	<b>\$87,965,985</b>
<b>Loan guarantee program</b>					
Wind				\$279,111	\$279,111
Biomass-anaerobic digester				1,065,850	\$1,065,850
Biomass-bioenergy			10,100,000	22,212,821	32,312,821
Energy efficiency				601,080	\$601,080
<b>Loan guarantee program total</b>			<b>\$10,100,000</b>	<b>\$24,158,862</b>	<b>\$34,258,862</b>

Source: USDA.



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## Other Ways the Federal Government May Subsidize Electricity

### DOE's Tribal Energy Activities Program and Renewable Energy Production Incentives Program Encourage Development of Renewable Energy Sources

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DOE's Tribal Energy Activities Program helps assess Native American energy needs and provides technical and financial assistance for energy efficiency and renewable energy project developments.

- From FY2002 to FY2007, this program received \$28.7 million in funding (in 2007 dollars).

DOE's Renewable Energy Production Initiatives Program provides financial incentive payments for renewable energy electricity produced and sold by qualified renewable energy generation facilities.

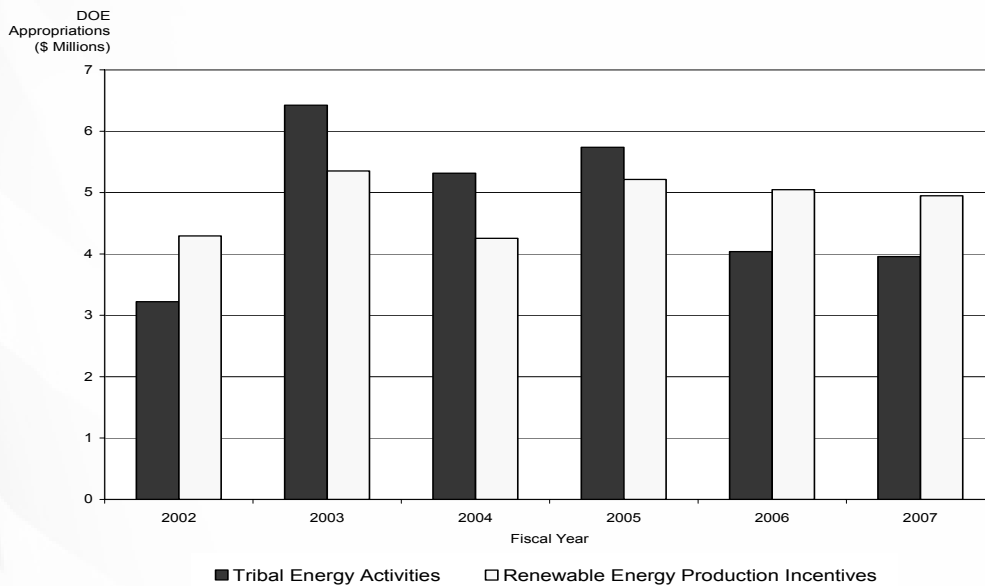
- Qualifying facilities are eligible for annual incentive payments of 1.5 cents per kilowatt-hour (1993 dollars and indexed for inflation) for the first 10-year period of their operation. Funds are subject to the availability of annual appropriations.
- From fiscal years 2002 to 2007, this program received \$29.1 million in funding (in 2007 dollars).

GAO has not evaluated the effectiveness of these programs.



## Other Ways the Federal Government May Subsidize Electricity

### DOE Funding for Tribal Energy Activities and Renewable Energy Production Incentives Similar from FY2002 to FY2007 (in 2007 dollars)



Source: GAO analysis of data provided by DOE and EIA.



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## Other Ways the Federal Government May Subsidize Electricity

### Price-Anderson Act Limits Nuclear Operator Liability

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#### Price-Anderson Act, as amended, sets liability limits and establishes insurance requirements.

- Establishes requirement for operators to purchase primary insurance. The amount is currently set at \$300 million per plant.
- Creates a secondary retrospective insurance pool of about \$10 billion (in 2006).
- Congress will determine plans and sources of funds, including possible industry sources, if an accident occurs that results in damages exceeding this limit.

#### Price-Anderson Act may constitute a subsidy.

- Limits the insurance needs and premium costs of the industry.

#### No credible quantification of the value is available.

#### Estimating the value will require among other things

- Estimate of the probability of an extraordinary nuclear occurrence for each plant, and
- Estimate of the extent of potential offsite economic damages.



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## Other Ways the Federal Government May Subsidize Electricity

### Decontamination and Decommissioning of Nuclear Fuel Manufacturing Facilities May Result in Federal Costs

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Federal government has had a role in uranium enrichment.

- For several decades, the federal government was responsible for nuclear fuel production (uranium enrichment) in the United States.
- Uranium Enrichment Decontamination and Decommissioning Fund established under Energy Policy Act of 1992. Unless reauthorized by Congress, contributions to the Fund will end in 2007.

May constitute a subsidy

- If the Fund is insufficient and the federal government pays for costs attributable to commercial nuclear operations, a potential subsidy exists.

Little is known about the value of this potential subsidy.

- GAO estimated costs could exceed fund by \$100 million to \$4.2 billion<sup>9</sup> (in 2007 dollars).

Estimating the value will require among things

- Cost and schedule to complete decontamination and decommissioning of facilities.
- Potential congressional actions if the fund is insufficient. Action may depend on DOE report that will be available by the end of 2007.

<sup>9</sup>GAO, *Uranium Enrichment: Decontamination and Decommissioning Fund Is Insufficient to Cover Cleanup Costs*, GAO-04-692 (Washington, D.C.: July 2, 2004).



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## Other Ways the Federal Government May Subsidize Electricity

### Construction and Operation of a Geologic Repository for Disposal of Radioactive Waste May Result in Federal Costs

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The federal government is to build and operate a facility to permanently dispose of waste.

- Nuclear Waste Policy Act of 1982 directs DOE to take title to and dispose of nuclear waste by 1998.
- DOE efforts to develop a permanent repository are required by statute to be solely focused on a yet-to-be-built repository at Yucca Mountain, Nevada. Most recent estimate is that facility will not be ready before 2017.
- Nuclear Waste Fund fees collected on nuclear power generation are set to fully recover estimated cost due to nuclear power of building and operating a geologic repository.

There may be an implicit subsidy in the program because, under the Act, the federal government has potentially assumed risks of cost over runs and schedule delays for the repository.

- A shortfall in the fund could become a potential government liability if fees are not adjusted..
- Government liabilities to nuclear power companies approaching \$7 billion are for failing to comply with the statutory requirement that DOE begin disposing of waste by 1998.

Additional work required to evaluate trust fund balances and potential subsidy, if any.



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## Selected GAO Products Related to Electricity Subsidies

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### General

*National Energy Policy: Inventory of Major Federal Energy Programs and Status of Policy Recommendations.* GAO-05-379. Washington, D.C.: June 10, 2005.

### Federal Research and Development

*Department of Energy: Key Challenges Remain for Developing and Deploying Advanced Energy Technologies to Meet Future Needs.* GAO-07-106. Washington, D.C.: December 20, 2006.

*Federal Research: Changes in Electricity-Related R&D Funding.* GAO/RCED-96-203. Washington, D.C.: August 16, 1996.

### Tax Expenditures

*Biofuels: DOE Lacks a Strategic Approach to Coordinate Increasing Production with Infrastructure Development and Vehicle Needs.* GAO-07-713. June 8, 2007.

*Government Performance and Accountability: Tax Expenditures Represent a Substantial Federal Commitment and Need to Be Reexamined.* GAO-05-690. September 23, 2005.

### Renewable Energy

*Renewable Energy: Wind Power's Contribution to Electric Power Generation and Impact on Farms and Rural Communities.* GAO-04-756. Washington, D.C.: September 3, 2004.



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## Selected GAO Products Related to Electricity Subsidies

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### Rural Utilities Service

*Rural Utilities Service: Opportunities to Better Target Assistance to Rural Areas and Avoid Unnecessary Financial Risk.* GAO-04-647. Washington, D.C.: June 18, 2004.

*Rural Development: Financial Condition of the Rural Utilities Service's Loan Portfolio.* GAO/RCED-97-82. April 11, 1997.

### Power Marketing Administration/Bonneville Power Administration/Tennessee Valley Authority

*Bonneville Power Administration: Better Management of BPA's Obligation to Provide Power Is Needed to Control Future Costs.* GAO-04-694. Washington, D.C.: July 9, 2004.

*Tennessee Valley Authority: Bond Ratings Based on Ties to the Federal Government and Other Nonfinancial Factors.* GAO-01-540. Washington, D.C.: April 30, 2001.

*Federal Electricity Activities: The Federal Government's Net Cost and Potential for Future Losses Volume 1.* GAO/AIMD-97-110. Washington, D.C.: September 19, 1997.

*Federal Electricity Activities: Appendixes to The Federal Government's Net Cost and Potential for Future Losses Volume 2.* GAO/AIMD-97-110A. Washington, D.C.: September 19, 1997.

*Power Marketing Administrations: Cost Recovery, Financing, and Comparison to Nonfederal Utilities.* GAO/AIMD-96-145. Washington, D.C.: September 19, 1996.

### Federal Loan Guarantee Programs

*The Department of Energy: Key Steps Needed to Help Ensure the Success of the New Loan Guarantee Program for Innovative Technologies by Better Managing Its Financial Risk.* GAO-07-339R. Washington, D.C.: February 28, 2007.



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## Selected GAO Products Related to Electricity Subsidies

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### Nuclear Issues

*Uranium Enrichment: Decontamination and Decommissioning Fund Is Insufficient to Cover Cleanup Costs.* GAO-04-692. Washington, D.C.: July 2, 2004.



# Appendix II: Comments from the Department of Energy's Power Marketing Liaison Office

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



**Department of Energy**  
Power Marketing Liaison Office  
Washington, DC 20585

October 16, 2007

Mr. Mark Gaffigan  
Acting Director, Natural Resources and Environment  
Government Accountability Office  
441 G Street NW  
Washington, DC 20548

Dear Mr. Gaffigan:

Thank you for the opportunity to comment on the draft Government Accountability Office (GAO) report "Federal Electricity Subsidies: Information on Research Funding, Tax Expenditures, and Other Activities That Support Electricity Production." Southeastern, Southwestern and Western Area Power Administrations, three of the four power marketing administrations (PMAs) of the Department of Energy (DOE), previously submitted technical comments on the report via e-mail. The following are general comments on the report that we would like included in Appendix II if possible.

- The PMAs are fulfilling their congressionally mandated mission of repaying all costs associated with Federal power production, as well as all costs assigned to power at the multipurpose Federal power projects within each agency's purview. The PMAs have determined the interest rates assigned to investments by law or by administrative procedures pursuant to law. The PMAs continue to have great concern with the methodologies GAO utilized when they performed their earlier work, which is referenced in this report, regarding financing costs assigned to investments that have not yet been fully repaid (referred to in this report as "appropriated debt").
- GAO has previously studied the PMAs in the following reports: GAO/RECD-86-186BR, "Federal Electric Power: Pricing Alternatives for Power Marketed by the Department of Energy," September 1986; GAO/AIMD-96-145, "Power Marketing Administrations: Cost Recovery, Financing and Comparison to NonFederal Utilities," September 1996; GAO/AIMD-97-110, "Federal Electricity Activities: The Federal Government's Net Cost and Potential for Future Losses," September 1997; GAO/RCED/AIMD-96-9FS, "Federal Electric Power: Operating and Financial Status of DOE's Power Marketing Administrations," October 1995; GAO/AIMD-98-164, "Power Marketing Administrations: Repayment of Power Costs Needs Closer Monitoring," June 1998; and GAO/AIMD-00-114, "Power Marketing Administrations: Their Ratesetting Practices Compared with Those of Nonfederal Utilities," March 2000. The PMAs' responses included in these reports are still valid and directly relate to the current GAO efforts.

See comment 1.

See comment 1.

Appendix II: Comments from the Department of Energy's Power Marketing Liaison Office

See comment 2.

- In comparing the PMAs' interest rates with those of investor-owned utilities, no mention is made of the PMAs' inability to refinance their debt. As a result of not being able to refinance their debt, the PMAs have established a best business practice for controlling interest expense where higher interest investments are repaid first. Repayment of highest interest-bearing investment first is compatible with keeping PMA power and transmission rates as low as possible consistent with sound business principles, which is mandated by law and delegation order. DOE policy and guidelines permit balloon payment methodology and the repayment of highest interest-bearing investment first. As a result, much of the unpaid interest-bearing investment has interest rates from years ago when interest rates were lower. This issue was previously addressed on page 48 of the March 2000 report entitled "Power Marketing Administrations: Their Ratesetting Practices Compared with Those of Nonfederal Utilities."

See comment 3.

- We suggest adding the following narrative to the report: "PMAs have lower imbedded costs because most Federal hydroelectric facilities were constructed at a time when costs of construction were lower." This sentence is taken directly from the October 1995 report entitled "Federal Electric Power: Operating and Financial Status of DOE's Power Marketing Administrations," GAO/RCED/AIMD-96-9FS, page 52.

See comment 4.

- The impact of initial project investments on the weighted interest rate average is to lower the overall weighted average. PMAs current investments are assigned interest rates provided by Treasury in meeting requirements of Department of Energy Order No. RA6120.2, paragraph 11 (b), and the authorizing legislation for the Colorado River Storage Project.

See comment 5.

- We suggest either deleting slide 36 or excluding the PMAs. We believe the comparison made on Slide 36 is not valid for several reasons. First, if the PMAs are to be compared with the electric industry, it would be more appropriate to compare their interest rates to other not-for-profit utilities. Second, the SEPA, SWPA and WAPA average interest rates on outstanding unpaid investment are compared with current bond rates. A comparison of the PMAs' current interest rates to current bond rates would be more accurate. Finally, the PMAs have different terms on their debt than other utilities. For example, the PMAs are not able to refinance their debt. Comparing the PMAs' interest rates to other utilities' rates implies the same terms on their debt, which is not accurate.

See comment 6.

- GAO indicates on Slide 33 that more work could be done in the future. If this occurs, GAO should factor in the "subsidy" power provides to the water community in terms of irrigation assistance (this applies to Western Area Power Administration, not Southeastern or Southwestern Power Administrations). In addition, in the case of the participating projects for the Colorado River Storage Project, power customers pay 5 times the irrigation capital costs to insure that all participating States receive their share of future construction funds. These are

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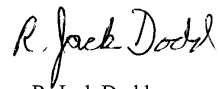
**Appendix II: Comments from the Department  
of Energy's Power Marketing Liaison Office**

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subsidies paid by power customers that benefit irrigators and the participating States.

Thank you for considering our comments. If you have any questions, please call me at 202-586-5581.

Sincerely,



R. Jack Dodd  
Assistant Administrator  
for Power Marketing Liaison

cc:

Dianne Williams, DOE Audit Liaison Specialist  
Sharon Sutton, DOE Audit Coordinator  
Jon Worthington, Administrator, Southeastern Power Administration  
Mike Deihl, Administrator, Southwestern Power Administration  
Timothy Meeks, Administrator, Western Area Power Administration



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The following are GAO's comments on the Department of Energy's Power Marketing Liaison Office letter dated October 16, 2007.

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## GAO Comments

1. We acknowledged PMA concerns during our previous work cited in the Liaison Office comments. We stand by the methodologies used when performing this earlier work, and our responses to PMA concerns regarding this earlier work are still valid.
2. The briefing slides included points for overall discussion rather than detailed information about the rates, terms, and conditions of PMA financing versus investor-owned utility financing. As we note in *Power Marketing Administrations: Their Ratesetting Practices Compared With Those of Nonfederal Utilities*, [GAO/AIMD-00-114](#) (Washington, D.C.: Mar. 30, 2000), direct comparisons of financing costs are somewhat difficult because the financing structures of PMAs and investor-owned utilities differ. We note that the PMAs' ability to defer repayment of appropriated debt and repay highest interest rate appropriated debt first offsets their general inability to refinance appropriated debt. We note this could be a disadvantage during times of declining interest rates. Here, Treasury bears the risk of increases in interest rates and PMAs, to some degree, bear the risk of decreases in interest rates.
3. This sentence is taken from the Department of Energy's Power Marketing Liaison Office letter commenting on the GAO report, rather than the actual GAO report. As noted, this portion of the briefing included points for overall discussion rather than detailed conclusions about the rates, terms, and conditions of PMA financing. As noted in the briefing, more work would be needed to do better quantify the subsidy, if any.
4. As noted, this portion of the briefing included points for overall discussion rather than detailed conclusions about the rates, terms, and conditions of PMA financing.
5. Comparing financing costs among federal, public, and investor-owned utilities is difficult and the briefing slide was meant for overall discussion rather than specific conclusions about relative financing costs. We indicate that we would need to do additional work in this area to provide Congress with more information on the relative financing costs of these groups.

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6. Any future work we do in this area would include close coordination and input from the PMAs.

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