



# Renewable Energy R&D Funding History: A Comparison with Funding for Nuclear Energy, Fossil Energy, and Energy Efficiency R&D

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## Summary

Energy research and development (R&D) intended to advance technology played an important role in the successful outcome of World War II. In the post-war era, the federal government conducted R&D on fossil fuel and nuclear energy sources to support peacetime economic growth. The energy crises of the 1970s spurred the government to broaden the focus to include renewable energy and energy efficiency. Over the 33-year period from the Department of Energy's inception at the beginning of fiscal Year (FY) 1978 through FY2010, federal spending for renewable energy R&D amounted to about 16% of the energy R&D total, compared with 14% for energy efficiency, 26% for fossil, and 37% for nuclear. For the 63-year period from 1948 through 2010, nearly 12% went to renewables, compared with 9% for efficiency, 25% for fossil, and 50% for nuclear.

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## Introduction

This report provides a cumulative history of Department of Energy (DOE) funding for renewable energy compared with funding for the other energy technologies—nuclear energy, fossil energy, and energy efficiency. Specifically, it provides a comparison that covers cumulative funding over the past 10 years (FY2001-FY2010), a second comparison that covers the 33-year period since DOE was established at the beginning of fiscal year 1978 (FY1978-FY2010), and a third comparison that covers a 63-year funding history (FY1948-FY2010).

## Guide to Tables and Charts

**Table 1** shows the cumulative funding totals in real terms for the past 10 years (first column), 33 years (second column), and 63 years (third column). **Table 2** converts the data from **Table 1** into relative shares of spending for each technology, expressed as a percentage of total spending for each period.

**Figure 1** displays the data from the first column of **Table 2** as a pie chart. That chart shows the relative shares of cumulative DOE spending for each technology over the 10 years from FY2001 through FY2010. **Figure 2** provides a similar chart for the period from FY1978 through FY2010. **Figure 3** shows a chart for FY1948 through FY2010.

## Background

The availability of energy—especially gasoline and other liquid fuels—played a critical role in World War II. Another energy-related factor was the application of research and development (R&D) to the atomic bomb and other military technologies. During the post World War II era, the federal government began to apply R&D to the peacetime development of energy sources to support economic growth. At that time, the primary R&D focus was on fossil fuels and new forms of energy derived from nuclear fission and nuclear fusion.

From FY1948 through FY1977 the federal government provided an extensive amount of R&D support for fossil energy and nuclear power technologies.<sup>1</sup> Total spending on fossil energy technologies over that period amounted to about \$15.7 billion, in constant FY2010 dollars. The federal government spent about \$47.5 billion (in constant FY2010 dollars) during that period for nuclear fission and nuclear fusion energy R&D.<sup>2</sup>

The energy crises of the 1970s spurred the federal government to expand its R&D programs to include renewable (wind, solar, biomass, geothermal, hydro) energy and energy efficiency technologies. Modest efforts to support renewable energy and energy efficiency began during the early 1970s. From FY1973 through FY1977 the federal government spent about \$1.6 billion (in

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<sup>1</sup> DOE. Pacific Northwest Laboratory. *An Analysis of Federal Incentives Used to Stimulate Energy Production*. 1980. The spending for fossil energy included coal, oil, and natural gas technologies.

<sup>2</sup> DOE (Pacific Northwest Laboratory), *An Analysis of Federal Incentives Used to Stimulate Energy Production*, 1980.

constant FY2010 dollars) on renewable energy R&D, \$143 million on energy efficiency R&D, and \$173 million on electric systems R&D.<sup>3</sup>

The Department of Energy was established by law in 1977. All of the energy R&D programs—fossil, nuclear, renewable, and energy efficiency—were brought under its administration. DOE also undertook a small program in energy storage and electricity system R&D that supports the four main energy technology programs.<sup>4</sup> DOE’s funding support for those technologies began in FY1978. Funding for all four of the main technologies skyrocketed initially, and then fell dramatically in the early 1980s.

**Table 1. DOE Energy Technology Cumulative Funding Totals**

(billions of 2010 dollars)

Technology	Period		
	FY2001-FY2010 (10 years)	FY1978-FY2010 (33 years)	FY1948-FY2010 (63 years)
Renewable Energy	\$ 6.42	\$ 19.50	\$ 21.06
Energy Efficiency	6.50	16.87	17.02
Fossil Energy	10.55	30.87	46.61
Nuclear Energy	8.85	43.63	91.12
Electric Systems	5.78	7.92	8.09
Total	\$38.10	\$118.79	\$183.91

**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); DOE (Pacific Northwest Laboratory), An Analysis of Federal Incentives Used to Stimulate Energy Production, 1980. Deflator Source: The Budget for Fiscal Year 2011. Historical Tables. Table 10.1. Gross Domestic Product and Deflators Used in the Historical Tables, 1940-2015.

**Table 2. DOE Energy Technology Share of Funding**

(percent; derived from Table 1)

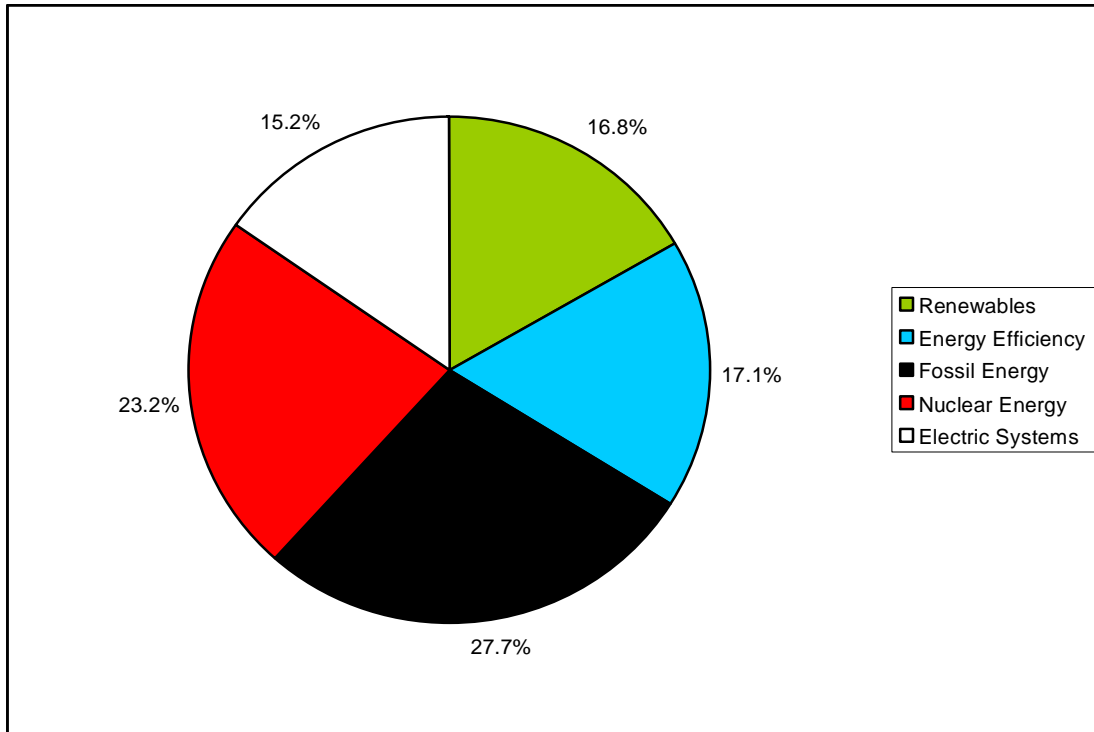
Technology	Period		
	FY2001-FY2010 (10 years)	FY1978-FY2010 (33 years)	FY1948-FY2010 (63 years)
Renewable Energy	16.8%	16.4%	11.5%
Energy Efficiency	17.1%	14.2%	9.3%
Fossil Energy	27.7%	26.0%	25.3%
Nuclear Energy	23.2%	36.7%	49.5%
Electric Systems	15.2%	6.7%	4.4%
Total	100.0%	100.0%	100.0%

<sup>3</sup> DOE Conservation and Renewable Energy Base Table. February 1990.

<sup>4</sup> This program includes R&D on advanced batteries to store electricity and transmission equipment to transfer electricity with less heat loss (i.e. at higher levels of energy efficiency).

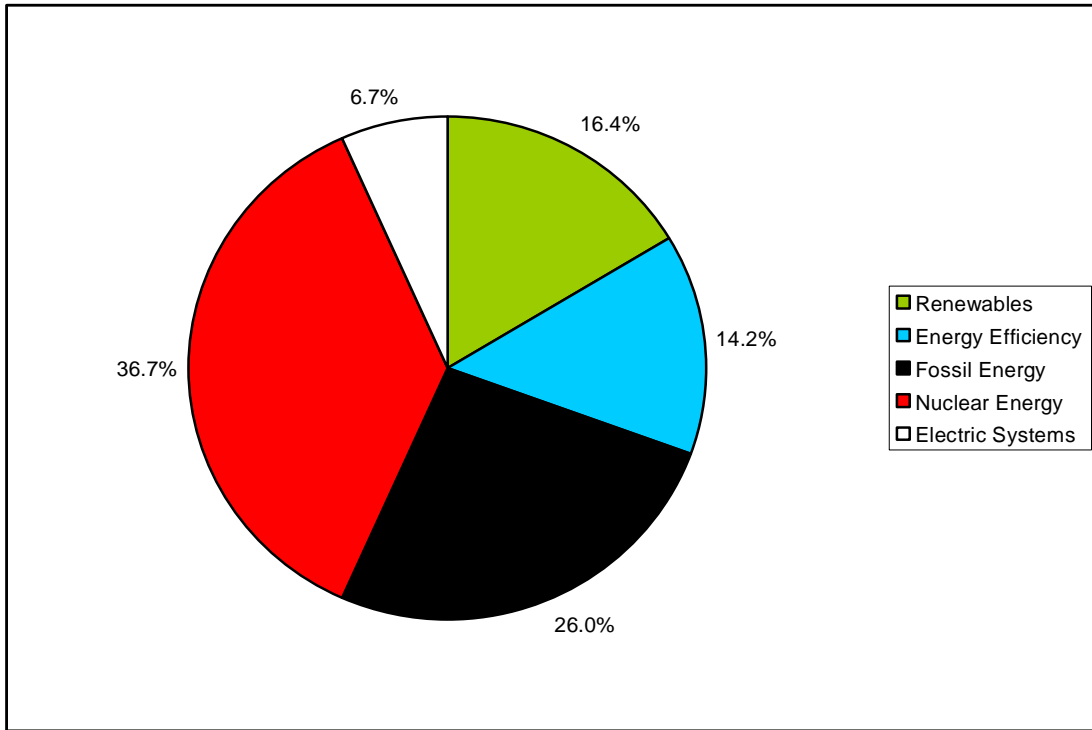
**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); DOE (Pacific Northwest Laboratory), An Analysis of Federal Incentives Used to Stimulate Energy Production, 1980; DOE Conservation and Renewable Energy Base Table, February 1990. Deflator Source: The Budget for Fiscal Year 2011. Historical Tables. Table 10.1. Gross Domestic Product and Deflators Used in the Historical Tables, 1940-2015.

**Figure 1. DOE Energy Technology Share of Funding, FY2001-FY2010**



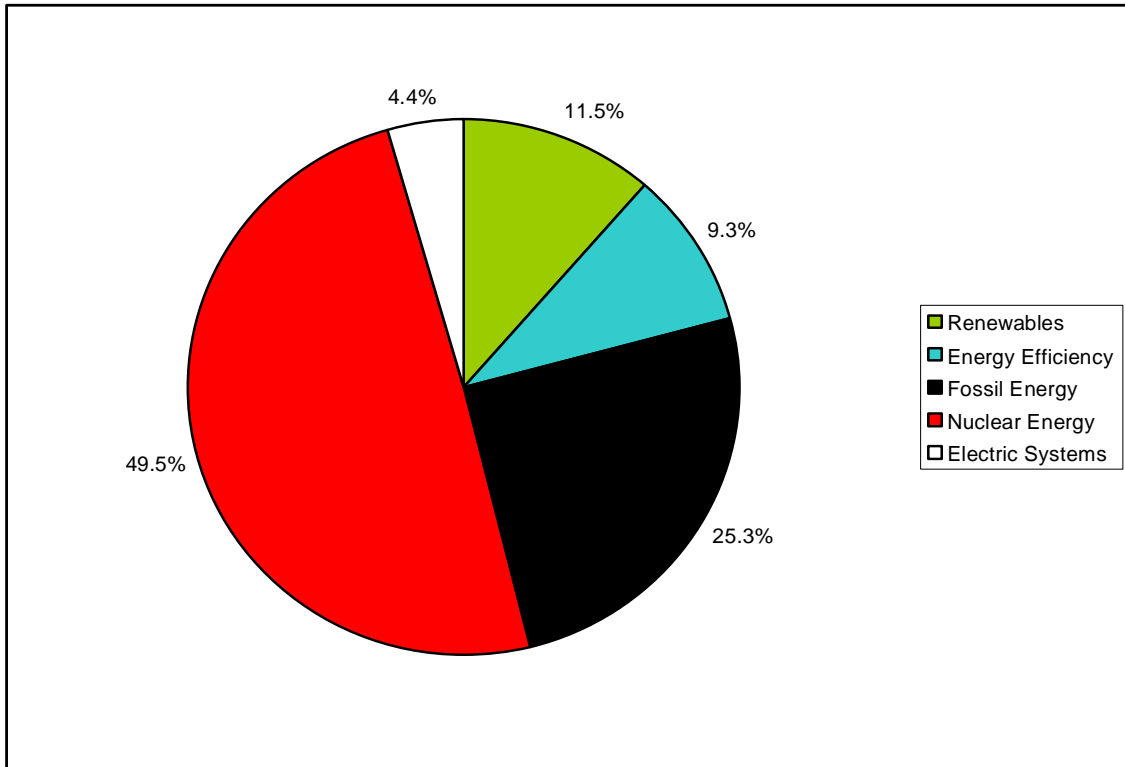
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Figure 2. DOE Energy Technology Share of Funding, FY1978-FY2010



**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); Deflator Source: *The Budget for Fiscal Year 2011*. Historical Tables. Table 10.1. Gross Domestic Product and Deflators Used in the Historical Tables, 1940-2015.

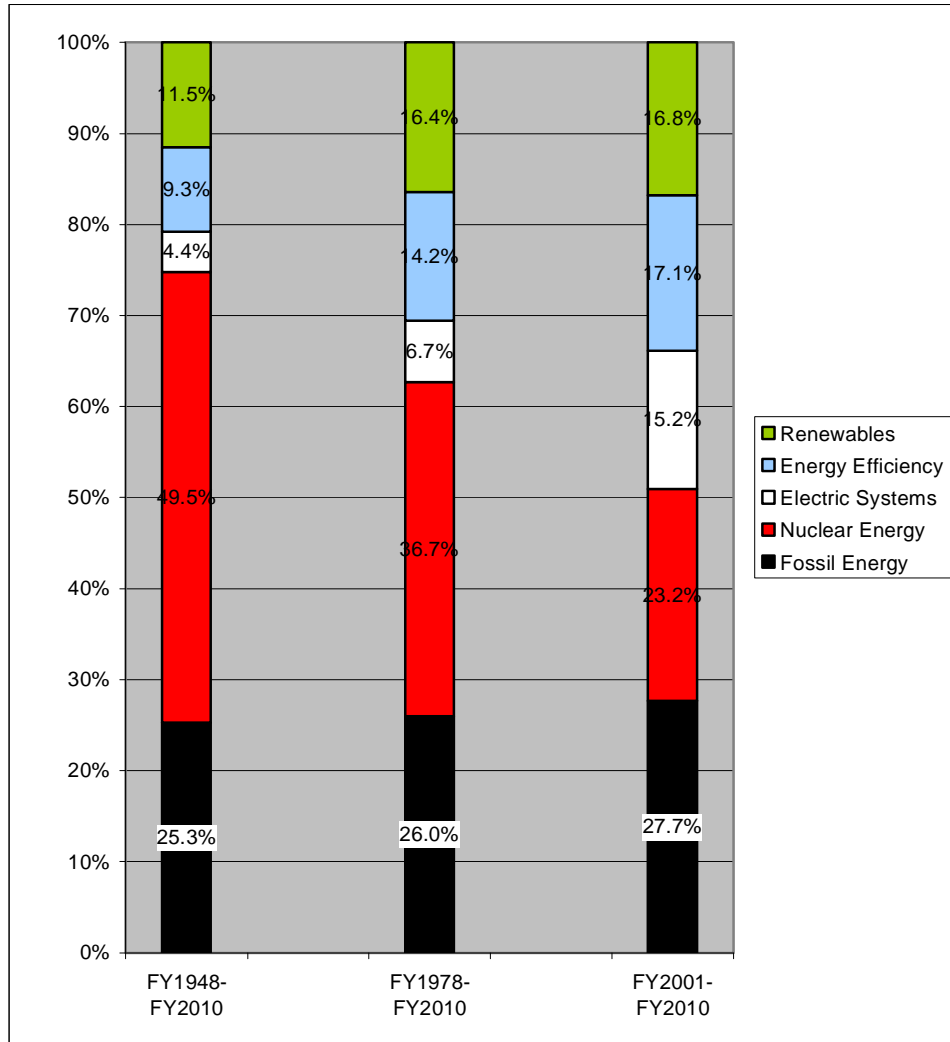
Figure 3. DOE Energy Technology Share of Funding, FY1948-FY2010



**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); DOE (Pacific Northwest Laboratory), An Analysis of Federal Incentives Used to Stimulate Energy Production, 1980; DOE Conservation and Renewable Energy Base Table, Feb. 1990. Deflator Source: The Budget for Fiscal Year 2011. Historical Tables. Table 10.1.



Figure 4. DOE Energy Technology Share of Funding, Comparison over Three Periods



**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); DOE (Pacific Northwest Laboratory), An Analysis of Federal Incentives Used to Stimulate Energy Production, 1980; DOE Conservation and Renewable Energy Base Table. Feb. 1990. Deflator Source: The Budget for the Fiscal Year 2011. Historical Tables. Table 10.1.

**Note:** Column to far left shows shares for the period FY1948-FY2010; middle column shows shares for period from FY1978-FY2010; and far right column shows shares for period from FY2001-FY2010.

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