



# 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 30-year period from the Department of Energy's inception at the beginning of fiscal Year (FY) 1978 through FY2007, federal spending for renewable energy R&D amounted to about 16% of the energy R&D total, compared with 15% for energy efficiency, 25% for fossil, and 41% for nuclear. For the 60-year period from 1948 through 2007, nearly 11% went to renewables, compared with 9% for efficiency, 25% for fossil, and 54% 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 (FY1998-FY2007), a second comparison that covers the 30-year period since DOE was established at the beginning of fiscal year 1978 (FY1978-FY2007), and a third comparison that covers a 60-year funding history (FY1948-FY2007).

## Guide to Tables and Charts

**Table 1** shows the cumulative funding totals in real terms for the past 10 years (first column), 30 years (second column), and 60 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 FY1998 through FY2007. **Figure 2** provides a similar chart for the period from FY1978 through FY2007. **Figure 3** shows a chart for FY1948 through FY2007.

## 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 \$15.4 billion, in constant FY2008 dollars. The federal government spent about \$46.4 billion (in constant FY2008 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 \$1.5 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 FY2008 dollars) on renewable energy R&D, \$140 million on energy efficiency R&D, and \$170 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 2008 dollars)

Technology	Period		
	FY1998-FY2007 (10 years)	FY1978-FY2007 (30 years)	FY1948-FY2007 (60 years)
Renewable Energy	\$ 3.94	\$ 15.43	\$ 16.96
Energy Efficiency	6.02	14.18	14.32
Fossil Energy	5.36	24.22	39.60
Nuclear Energy	6.41	38.62	85.01
Electric Systems	0.93	2.85	3.02
Total	\$22.66	\$95.30	\$158.91

**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 2009. Historical Tables. Table 10.1. Gross Domestic Product and Deflators Used in the Historical Tables, 1940-2013. p. 194-195.

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

(percent; derived from Table 1)

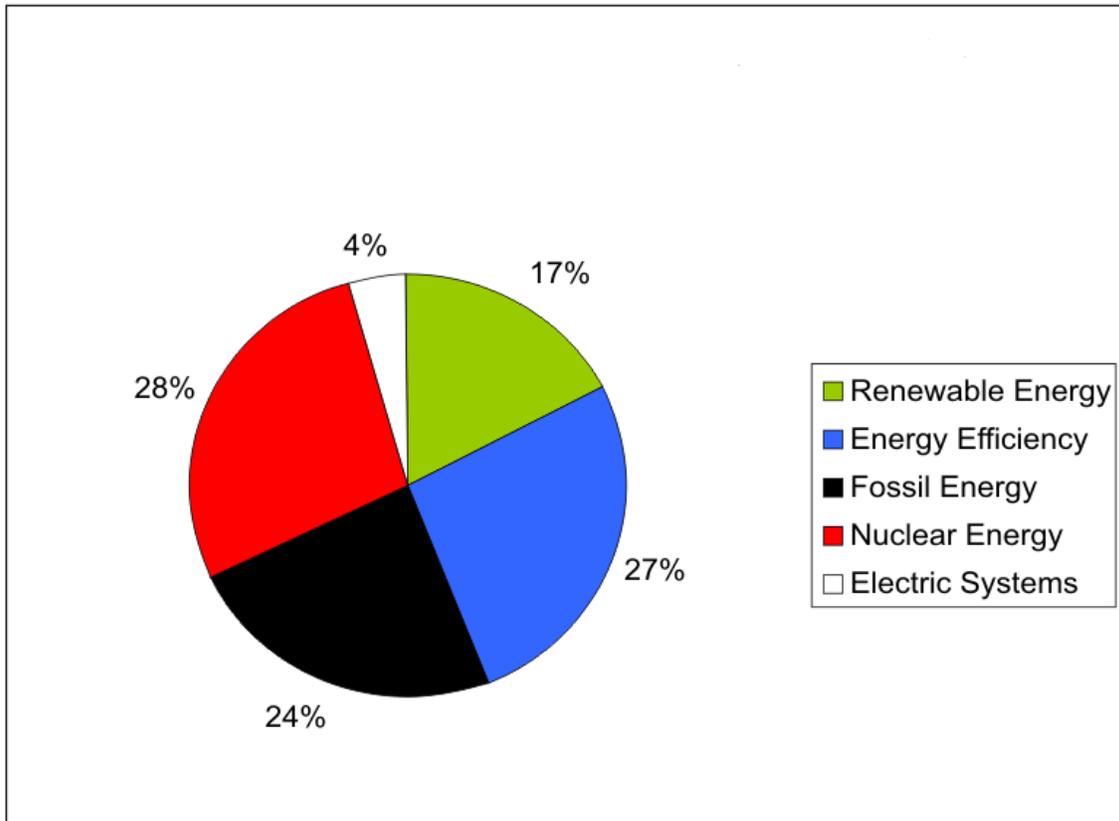
Technology	Period		
	FY1998-FY2007 (10 years)	FY1978-FY2007 (30 years)	FY1948-FY2007 (60 years)
Renewable Energy	17.4%	16.2%	10.7%
Energy Efficiency	26.6%	14.9%	9.0%
Fossil Energy	23.7%	25.4%	24.9%
Nuclear Energy	28.3%	40.5%	53.5%
Electric Systems	4.1%	3.0%	1.9%
Total	100.0%	100.0%	100.0%

<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).

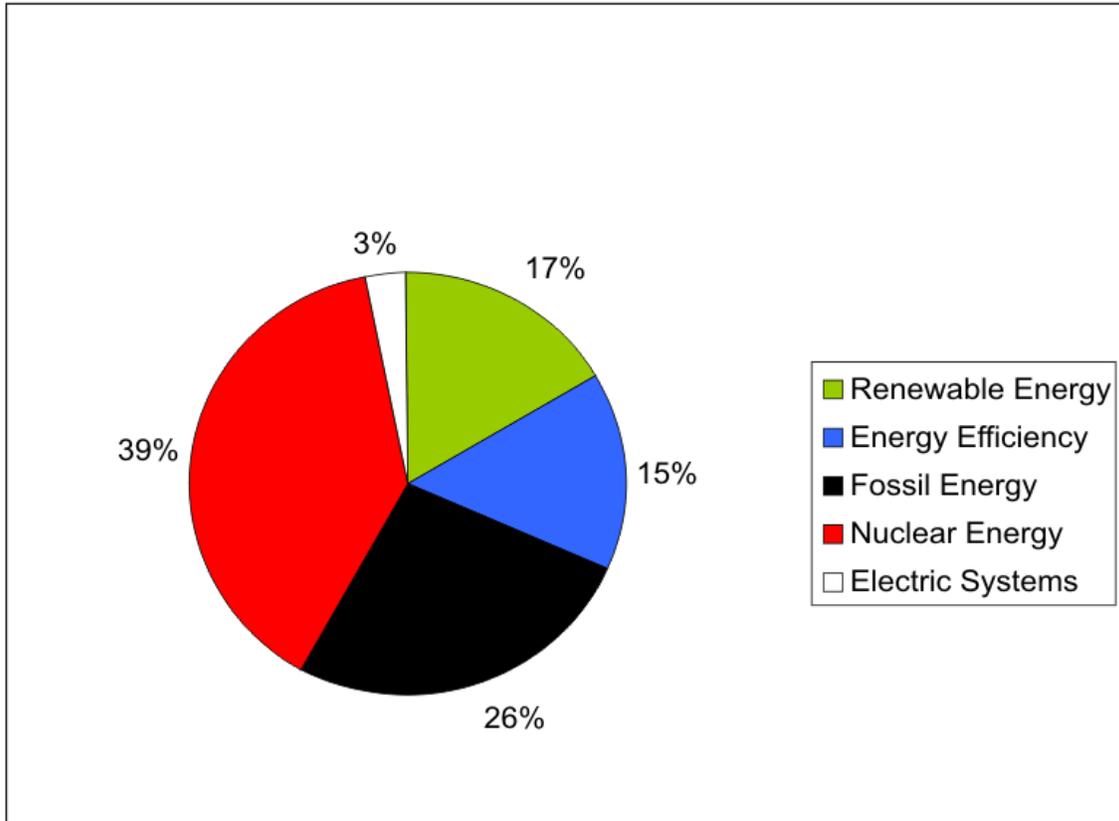
**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); DOE (Pacific Northwest Laboratory), An Analysis of Federal Incentives Used to Stimulate Energy Production, 1980; DOE Conservation and Renewable Energy Base Table, February 1990. Deflator Source: The Budget for Fiscal Year 2009. Historical Tables. Table 10.1. Gross Domestic Product and Deflators Used in the Historical Tables, 1940-2013. p. 194-195.

Figure 1. DOE Energy Technology Share of Funding, FY1998-FY2007



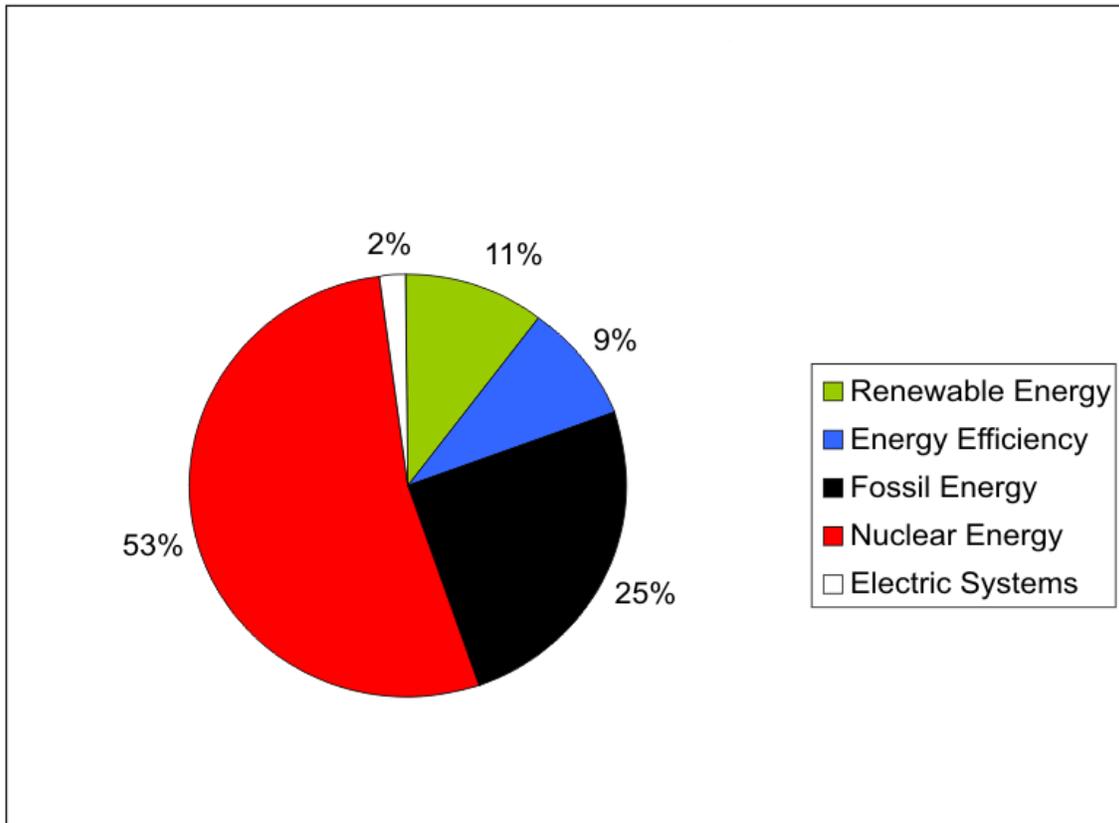
**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); Deflator Source: *The Budget for Fiscal Year 2009*. Historical Tables. Table 10.1. Gross Domestic Product and Deflators Used in the Historical Tables, 1940-2013. p. 194-195.

Figure 2. DOE Energy Technology Share of Funding, FY1978-FY2007



**Sources:** DOE Budget Authority History Table by Appropriation, May 2007; DOE Congressional Budget Requests (several years); Deflator Source: *The Budget for Fiscal Year 2009*. Historical Tables. Table 10.1. Gross Domestic Product and Deflators Used in the Historical Tables, 1940-2013. p. 194-195.

Figure 3. DOE Energy Technology Share of Funding, FY1948-FY2007



**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 2009, Historical Tables, Table 10.1, p. 194-195.

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