Energy

Summary

Abundant, affordable energy is essential to the American way of life, and the federal government uses subsidies to ensure that it remains available. The government implements dozens of energy policies and programs subsidizing research, domestic energy production, energy efficiency and many other activities. Even as it tries to hold down the price of traditional fossil fuels such as oil and gas, the government also supports greener alternatives and seeks to reduce energy consumption.

Subsidyscope found that the federal government spent almost $25 billion in fiscal year 2009 on grants and tax expenditures likely to include subsidies in the energy sector. This excludes significant, yet unquantified, subsidies provided through regulations, loans, loan guarantees and contracts. Despite its wide-ranging involvement, the government actually plays a smaller role in the energy sector of the economy than it does in other sectors such as housing or transportation.[1] That said, federal grants alone to the energy sector quadrupled to over $18 billion in fiscal year 2009, due in large part to stimulus funding under the American Recovery and Reinvestment Act.

Subsidyscope relies on federal data to calculate these estimates, and as such, any data quality issues in the government's data will be reflected in our analysis. As previously noted, Subsidyscope believes there are significant problems with some of the government's information. However, it is the best data available and it provides a baseline for assessing federal intervention through subsidies in each economic sector relative to other sectors. By publishing these estimates, the data are more accessible and their shortcomings can be more easily identified and, ultimately, improved.

Federal Activities and Subsidies in the Energy Sector

The U.S. Department of Energy (DOE) alone spent about $13.3 billion in the energy sector in fiscal year 2009, while other federal agencies also paid out billions in this area, either directly or indirectly. Through tax credits and deductions, the U.S. Department of the Treasury (Treasury) was responsible for $6.3 billion in energy-related spending in fiscal year 2009. During the same period, the U.S. Department of Health and Human Services (HHS) spent $5.1 billion to help low-income families afford their heating bills. Total federal spending on tax expenditures and grant programs likely to contain subsidies to the energy sector totaled $24.9 billion in fiscal year 2009. (This estimate does not include potential subsidies through regulations, loans, loan guarantees and contracts, which were not systematically estimated by the government.) Historically, such spending has been much lower. For example, federal spending on energy sector grants that are likely to contain a subsidy have averaged just over $4 billion a year from fiscal years 2000 through 2008, while energy sector tax expenditures also averaged roughly $4 billion per year over that same period.

Subsidyscope divides federal support of the energy sector into four categories: direct expenditures (grants and contracts), tax expenditures, risk transfers (mostly loans and loan guarantees) and

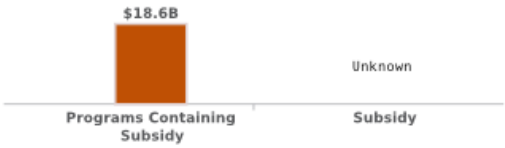
regulations. Each of these categories is summarized below.

Grants and Contracts

In fiscal year 2009, the federal government awarded $18.6 billion in direct grants to companies or organizations engaged in energy-related work, or nearly 3 percent of all grants the government awarded during that period. Subsidyscope deems all of these programs as likely to contain a subsidy, and therefore includes all of them in our analysis. The largest grant program in the energy sector is DOE's Weatherization Assistance for Low Income Persons (WAP). The program received $5.6 billion in fiscal year 2009, $5.4 billion more than the year before. All of this increase came from the American Recovery and Reinvestment Act.[2] Click here to search Subsidyscope's database of energy-related grants.

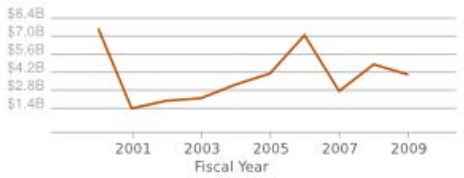
The government spent another $4.3 billion on non-competed contracts for energy-related goods or services. Subsidyscope considers non-competed contracts as more likely to contain a subsidy component than competed contracts. Click here to search Subsidyscope's database of energy-related non-competed contracts.

Figure 1: Energy Sector Direct Expenditures FY2009



Source: Subsidyscope analysis of data from USAspending.gov.

Figure 2: Energy Sector Non-competed Contracts FY2000-2009



Source: Subsidyscope analysis of data from USAspending.gov. Estimates are in nominal dollars and reflect the data as they appear in USAspending.gov at the time of this analysis.

Tax Expenditures

The energy sector claimed about $6.3 billion in federal tax credits and deductions in fiscal year 2009. That figure does not include broad-based tax provisions, such as accelerated depreciation of machinery and equipment, which benefited firms across the entire economy. The largest tax break for energy companies allows them to expense their exploration and development costs for oil, a provision that cost the Treasury about $1.6 billion in fiscal year 2009.[3]

Figure 3: Energy Sector Tax Expenditures FY2009

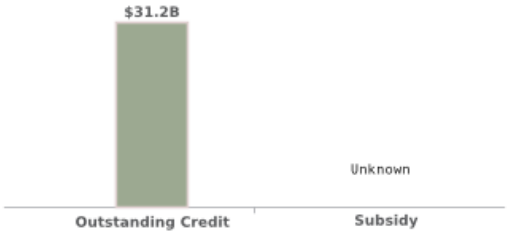
Source: Subsidyscope analysis of Analytical Perspectives. OMB. Budget of the U.S. Government, Fiscal Year 2011. p. 209.

In recent years, federal tax policy has subsidized fossil fuels to a greater extent than renewable energy sources or conservation. Over the next five years, however, federal tax policy is likely to provide greater support to renewable and alternative fuels than to any other category. For more on tax expenditures in the energy sector, see here.

Figure 4: Energy Sector Risk Transfers FY2009

Risk Transfers

The federal government also subsidizes the energy sector with loans and loan guarantees, assuming financial risks that otherwise would be borne by investors or other entities. These "risk transfers" totaled $31.2 billion in fiscal year 2009 -- $16.7 billion in direct loans to



Source: Subsidyscope analysis of data from the Federal Credit Supplement. OMB. Budget of the U.S. Government, Fiscal Year 2010. Tables 1 and 2.

companies and $14.5 billion in loan guarantees. Prior to 2009, direct loan programs in the energy sector focused primarily on improving electricity transmission in rural areas, while loan guarantee programs focused on both electricity transmission and renewable energy.[4] In fiscal year 2009, the largest direct-loan program was DOE's Advanced Technology Vehicle Manufacturing Loan Program, and the largest loan guarantee initiative was DOE's Innovative Energy Efficiency, Renewable Energy and Advanced Transmission and Distribution Technologies Program. See Subsidyscope's risk transfers page for more details on these and other loan and loan guarantee programs.

Regulations

The federal government subsidizes the energy sector through regulations, which can significantly benefit particular producers or consumers. Unfortunately, there is no way to methodically identify and quantify these subsidies. Subsidyscope's regulations page describes some of the regulatory subsidies in the energy sector, such as royalty relief for the oil and gas industry. Other regulatory subsidies in the energy sector include the renewable fuels standard (RFS), and environmental response cleanup.

Structure of Sector

In addition to the pages above, Subsidyscope examines the size and scope of the energy sector and explains the economic rationale for government intervention here.

Limitations of Government Data

As with other sectors, Subsidyscope relies solely on government figures to estimate subsidies and spending on programs that are likely to contain a subsidy. Subsidyscope recognizes that government data can be of poor quality and in particular may not include some types of subsidies. The data may also contain gaps that prevent allocating published subsidy data to recipient sectors. All of these limitations can result in omissions of federal support that may, nonetheless, influence markets. Subsidyscope presents examples of these limitations with respect to energy in this table.

An important objective of the Subsidyscope initiative is to help identify such gaps and other data problems so that, over time, they can be addressed and estimates of subsidies and subsidy spending will continually improve. For instance, Subsidyscope is in the process of acquiring additional information from Treasury which, we hope, will allow a credible apportionment of some tax expenditures across economic sectors that, at present, are available only economy-wide. With this in mind, we will continue to evaluate the energy sector and identify data gaps and needs that would result in a more accurate estimate of subsidies and subsidy spending and post this assessment on this site. If you have suggested improvements regarding federal estimates of subsidies and subsidy spending in the energy sector, please contact us.

1. *Subsidyscope analysis of the Transportation Sector. Analysis of the Housing Sector is forthcoming.*
2. *Subsidyscope analysis of USAspending.gov.*
3. *Subsidyscope analysis of FY2009 data in Office of Management and Budget (OMB). "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011."*
4. *Subsidyscope analysis of data from multiple years of the Federal Credit Supplement, available here.*

Last updated September 9, 2010.

The Pew Charitable Trusts is driven by the power of knowledge to solve today's most challenging problems. Pew applies a rigorous, analytical approach to improve public policy, inform the public and stimulate civic life. We partner with a diverse range of donors, public and private organizations and concerned citizens who share our commitment to fact-based solutions and goal-driven investments to improve society.

Structure of the U.S. Energy Sector

Energy usage is integral to the U.S. economy and way of life. Americans use energy to heat and cool homes, fuel vehicles and power industrial processes, among many other things. In 2008 the United States consumed nearly 100 quadrillion Btu of energy from five key sources: petroleum (37 percent), natural gas (24 percent), coal (23 percent), nuclear electric power (9 percent) and renewable energy (7 percent).[1]

While energy consumption is intrinsic to the country's wellbeing, there are both large and small downsides to the nation's current energy usage and production patterns. These include: national security concerns related to foreign oil supply; global warming associated with a range of fossil fuels; water pollution from domestic oil spills and ethanol production; potential radiation releases from nuclear power facilities; and the disturbance of natural habitats resulting from hydroelectric dams, among many others.

Government funding of the energy sector supports a wide array of activities, including research and development, assistance to companies that engage in energy production and assistance to low-income citizens, as well as encouragement of greater energy efficiency and conservation. This support varies by energy type, but influences the entire fuel chain. These activities are also supported through a wide-variety of programs at several federal agencies including, but not limited to, the Department of Energy, the Department of Agriculture, the Department of Health and Human Services and the National Science Foundation.

Consistent with our methodology and the treatment of other economic sectors, Subsidyscope categorizes subsidies for the energy sector into three categories: direct expenditures (which consist of grants and contracts), tax expenditures and risk transfers. In the future, Subsidyscope also plans to provide more information on subsidies delivered through regulations, which we discuss on our regulatory page. Each link above provides a more in-depth analysis of each of these categories. For a summary of these activities and an overview of Subsidyscope's analyses in these areas, see our summary page.

The breadth of federal energy programs reflects the multiple goals the federal government simultaneously pursues in the energy sector. Sometimes these programs conflict with each other. For instance, the federal government promotes the development and use of domestic coal reserves by taxing royalties from coal deposits at a lower rate (see our tax expenditures page). This tax subsidy was worth $70 million in fiscal year 2009.[2] However, burning coal, relative to other sources of energy, releases large amounts of carbon dioxide into the air,[3] and the federal government also carries out a number of programs, such as the renewable fuel standard (see our regulatory page), that attempt to reduce greenhouse gas emissions.[4] Thus one energy program incidentally increases greenhouse gas emissions while another attempts to decrease them.

This overview provides a synopsis of the economic rationale for government intervention in the energy

sector, followed by a brief summary of the size and scope of the sector. This Web page also briefly describes related issues relevant to subsidies in the sector, such as electricity production and water usage. Note that this discussion takes a broad look at energy in the United States and is not intended to explore in detail the myriad issues that exist in the sector. Rather, it is intended to serve as general context for examining federal spending on energy-related subsidies.

Economic Rationale for Government Intervention in the Energy Sector

From an economic perspective, there are various market failures that serve as a rationale for government intervention in markets. Two such problems account for the primary reasons the government gets involved in the energy sector: externalities and public goods. This is not an attempt to downplay the role that other factors inevitably play in the formulation of government policies, or to imply that the subsidies that currently exist are justified on economic grounds. Rather this section describes the theoretical economic justifications for intervention in the sector.

Externalities

When an activity of a person or corporate entity directly affects the wellbeing of another in a way that is not reflected in the activity's market price, that cost (or benefit) is called an externality. Externalities may be negative or positive. In the energy sector, there are various negative externalities, both large and small, such as air pollution from burning fossil fuels, environmental destruction from oil spills and adverse aesthetics from power lines and wind turbines. Economic theory argues for taxing products or services directly if they impose externalities in order to ensure that the price charged for the goods or services reflect their full cost to society, including the cost of the externality.[5] Similarly, if there are positive externalities resulting from a particular good or activity, such as a hydroelectric dam providing flood control,[6] the government could encourage such goods or activities through subsidies that make its price better reflect these benefits.[7] As a result, these taxes and subsidies can lead to a more efficient allocation of resources.

Public Goods

A public good is a product or service that once one person is able to enjoy it, there is no cost for another person to enjoy it (it is *nonrivalrous*). Further, once public goods are enjoyed by one person, it is difficult or impossible to exclude others from doing so as well (making them *nonexcludable*). Public goods include things like firework displays, roads, parks, national defense and knowledge resulting from basic research. Such goods can be consumed collectively by all, but it is typically too expensive to exclude nonpaying users from enjoying them. The collective nature of public goods makes them at risk for being underprovided by the market; for example, you might not maintain a lighthouse if you know your neighbor will maintain it and you can benefit for free. In economics, this is called free riding. Thus, it may make sense to have the government provide and/or subsidize such goods.

An example of a public good in the energy sector is knowledge obtained from basic research. Research that could lead to the development of clean affordable energy supplies which benefit everyone, but require that someone pay upfront for such knowledge, may be undersupplied because companies that do not pay for the research can wait until the results are available and then use the information to develop their own product, a form of free riding. In order to correct this, the government may support research to encourage firms to make discoveries that will ultimately benefit everyone.

While these two market failures, externalities and public goods, cover a broad range of the rationale for intervening in the energy sector, they do not exhaust the types of market failures in the energy sector. Nor does the presentation of these two market failures intend to justify any particular federal policy choices or spending. Subsidyscope aims to present information and data on federal spending

and subsidies, and does not take a position on their value.

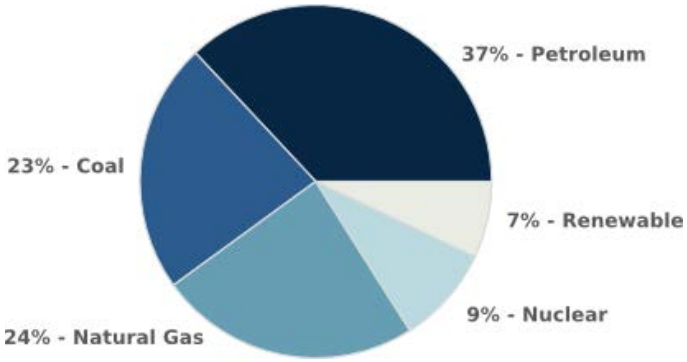
Size, Scope and Composition of the Sector

The energy sector is instrumental to nearly every other sector in the economy; however, depending on how the sector is defined, it could be considered smaller than most other economic sectors. Based on one definition of the sector, in 2007, the energy sector's gross domestic product (GDP)—or total economic output—reached $526 billion, out of a total national GDP of $13.8 trillion that year.[8]

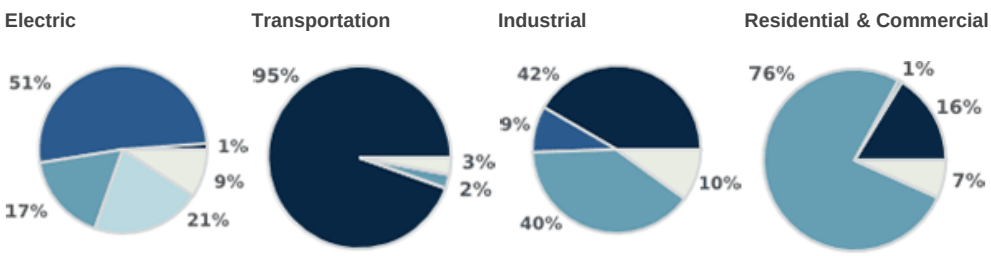
In 2008, the U.S. consumed 99.3 quadrillion Btu[9] of total energy,[10] nearly three times as much as in 1950 (34.6 quadrillion Btu) and more than double the amount consumed in 1960 (45.1 quadrillion Btu). On the other hand, it was a small increase over the amount consumed in 2000 (99 quadrillion Btu).[11] Normalizing these trends on a per capita basis, the U.S. consumed about 227 million Btu per person in 1950. This consumption grew to more than 350 million Btu per person by 2000, and decreased to about 327 million Btu per person by 2008.[12] These figures illustrate the gains in efficiency of the country's energy usage. For context, one Btu is "approximately equal to the energy released in the burning of a wood match … and one billion Btu equals all the electricity that 300 households consume in one month," according to the Energy Information Administration (EIA).[13]

Figure 1 below illustrates the primary sources of U.S. energy consumption (petroleum, coal, natural gas, nuclear, renewable, etc.) and the sectors powered by those energy sources. Certain forms of primary energy are more applicable to various end uses. Electricity production, for example, consumed the largest share of the total primary energy supply in 2008.[14] Petroleum is largely used to meet transportation needs, though this fuel also powers a portion of industrial and residential uses. The following sections provide a brief overview of the various types of primary energy sources used in the U.S., followed by an overview of the federal electric power production sector and the issue of water use in the energy sector.

Figure 1: U.S. Primary Energy Consumption by Source, 2008



U.S. Primary Energy Consumption by Sector, by Source, 2008



Source: Subsidyscope analysis of data from Energy Information Administration, "Annual Energy Review 2008." June 2009. Tables 1.3; 2.1b - 2.1f.

Note:
Figure 1 "illustrates the supply and demand of primary energy only; total energy used by the residential and commercial,

industrial, and transportation sectors comprises the primary energy used by each sector plus that sector's share of all primary energy supplied to the electric power sector to generate the electricity that is subsequently used by the sector." EIA notes the numbers are "preliminary." Further, coal cokes net imports and net electricity imports are excluded from presentation in the chart, but make up 0.04 percent and 0.11 percent, respectively. Electric includes electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat to the public. Industrial includes industrial CHP plants and industrial electricity-only plants. Residential and Commercial includes CHP and commercial electricity-only plants. For electric chart, imports comprise 0.3 percent of the total.

Crude Oil

More of the energy consumed in the U.S. comes from petroleum (37 percent in 2008) than from any other source.[15] Energy related oil and petroleum products include gasoline, diesel fuel, heating oil and propane. In 2008, the U.S. consumed 19.5 million barrels of petroleum per day,[16] but produced only 6.7 million barrels per day,[17] meaning that roughly 34 percent of the nation's petroleum needs were supplied from domestic sources. Seventy-one percent of the petroleum consumed was used in meeting transportation needs, 23 percent was used by the industrial sector, 5 percent was used by the residential and commercial sector, and about 1 percent was used for electricity.[18] See Figure 1 for more on primary energy sources and their end uses.

U.S. petroleum use accounted for 23 percent of total worldwide consumption for 2008, with China and Japan following, according to the U.S. Department of Energy (DOE). Within the U.S. that same year, California used about 11 percent of total U.S. consumption, with Texas at 10 percent and Florida at 6 percent.[19]

Some of the subsidies available to the oil, petroleum and natural gas industries (see the next section for a discussion of natural gas) include tax expenditures that Subsidyscope discusses here, such as the expensing of exploration and development for fuels, the ability for companies to deduct a percentage of the cost of drilling or mining for fuels and the temporary 50 percent expensing provision for equipment used in refining liquid fuels. These three subsidies combined resulted in an estimated revenue loss for the federal government of $2.8 billion in fiscal year 2009.[20]

Further, the oil and gas industry receives an implicit subsidy to produce oil and gas on federal lands through a regulatory subsidy called "royalty relief," or a reduction in the amount of royalties these companies must pay to the federal government in return for extracting its natural resources. As Subsidyscope explains in more detail here, royalty relief is a subsidy to oil and gas producers that is intended to promote domestic oil and gas production, thereby reducing oil and gas imports. Unfortunately, there is no overall estimate of the total subsidy provided by royalty relief, but government estimates for specific areas indicate it is in the billions of dollars every year. For instance, in 2008 the U.S. Government Accountability Office (GAO) estimated the cost of royalty relief for deep water areas in the Gulf of Mexico for the four years from 1996 to 2000 to be between $21 billion and $53 billion.[21]

Natural Gas

In 2008, natural gas supplied about 24 percent of total U.S. energy use, with 21.2 quadrillion Btu of dry natural gas produced in the U.S., and 23.8 quadrillion Btu consumed that same year.[22] In 2008, the U.S. imported about 12.7 percent of natural gas it consumed.[23] Natural gas was used evenly by the industrial sector and the residential and commercial sectors—both at about 34 percent each. Twenty-nine percent of the natural gas consumed was used by the electric power sector and three percent was used for transportation.[24]

U.S. production and consumption of natural gas has increased over the past few years (from 2006 to 2009), while imports have dropped (from 2007 to 2009).[25] Natural gas is the main heating fuel for slightly more than half of the homes in the U.S., and is also used to fuel stoves, water heaters, clothes dryers and other household appliances.[26]

In addition to the subsidies for the oil, petroleum and natural gas industries highlighted in the previous

section, an additional tax subsidy specific to the natural gas industry allows firms to accelerate the depreciation of their natural gas pipelines when calculating how much to write off for tax purposes. This resulted in an estimated revenue loss of $80 million to the U.S. Department of the Treasury (Treasury) in fiscal year 2009.[27]

Coal

In 2008, nearly 1.2 billion short tons of coal were consumed in the U.S. Virtually all of this coal came from domestic mines.[28] Roughly 91 percent of domestic coal resources were used to produce electricity in 2008, with most of the remaining balance used for industrial purposes.[29] Despite its heavy use to produce electricity, it generates only about half of the electricity the nation consumes,[30] and about a quarter of total U.S. primary energy consumption.[31] The U.S. has exported about 5 percent of its coal, on average, over the past 10 years, and some plants in the U.S. import coal when it is cheaper than having it shipped from domestic mines.[32]

While coal is an inexpensive and abundant primary energy source for electricity, relative to other energy sources, when burned it has higher carbon dioxide emissions than oil and natural gas,[33] and also emits air pollutants such as sulfur dioxide, nitrogen oxide and mercury, which have been linked to health and environmental damage. Further, coal extraction is associated with other externalities such as occupational risks, negative impacts on ecosystems, and the adverse alteration of landscapes and scenic views in areas where it is mined.[34]

There are several specific tax subsidies to the coal industry. For example, the tax credit for investment in clean coal facilities resulted in an estimated loss to the Treasury of $180 million in fiscal year 2009, while the treatment of royalties from coal as capital gains income, rather than ordinary income, cost the Treasury an estimated $70 million that same year.[35]

Renewable Energy

Renewable energy[36] includes biomass (wood and wood waste, municipal solid waste, landfill gas, biogas and ethanol or biodiesel), hydropower (water), geothermal, wind and solar energy. These sources of energy are replaced in nature over a relatively short time frame, whereas fossil energy replacement is very long compared to the human time scale. In 2008, renewable energy sources provided about 7 percent of total energy consumption in the U.S. (7.3 quadrillion Btu).[37] About half of this renewable energy was used for electricity generation (51 percent), 28 percent was harnessed by the industrial sector, 11 percent was used for transportation purposes, and 10 percent was employed by the residential and commercial sectors.[38]

The largest source of renewable energy is biomass, which comprised 53 percent of renewable energy in 2008.[39] Biomass includes ethanol, which is an alcohol fuel made from the sugars in various grains or other crops, such as corn, barley, sugar cane or rice.[40] In the U.S., virtually all of the ethanol produced is used to make "E10" or "gasohol," a mixture of 10 percent ethanol and 90 percent gasoline. Biodiesel is a biodegradable fuel made from vegetable oils, fats or greases—such as recycled restaurant grease.[41] Because almost all biomass fuel resources rely on land and other inputs such as water and fertilizer, their environmental profiles vary widely depending on the feedstock and production systems used to grow them.

In the U.S., hydropower produces the most electricity of all renewable energy sources; it accounted for 6 percent of total U.S. electricity generation and 67 percent of electrical generation from renewables in 2008.[42] That same year, wind machines generated about 1.3 percent of total U.S. electricity generation, or enough to power about 4.6 million households for the year.[43] In 2008, U.S. geothermal power plants, located solely in 7 western states, produced 0.4 percent of total U.S. electricity generation.[44]

Nuclear

According to DOE, as of 2009, there were 104 commercial nuclear reactors operating at 65 power plants in 31 states, producing about 20 percent of U.S. electricity.[45] In 2008, all of the nuclear electric

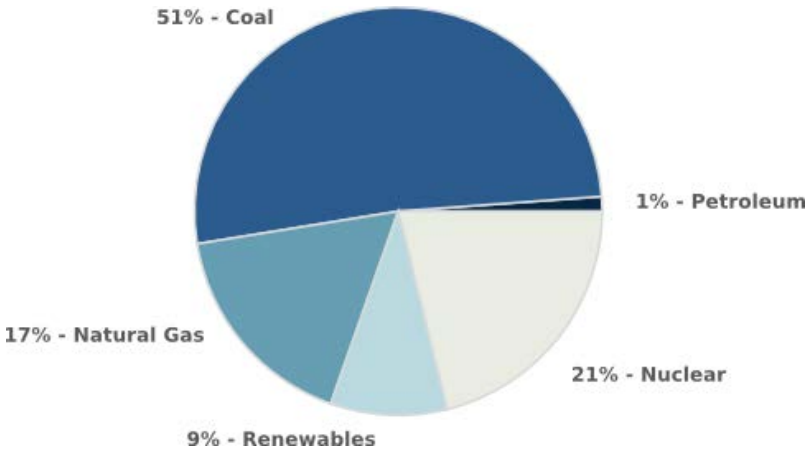
power produced in the U.S. was used for producing electric power.[46] Thirty-one countries have commercial nuclear reactors. The U.S. has the largest aggregate generating capacity in the world. The second highest producer, France, relies on nuclear electric power for 80 percent of its electricity.[47]

One advantage of nuclear power is that it generates very few, if any, carbon emissions.[48] Yet this type of power does have serious problems regarding waste disposal and the risk of an accident that could result in the release of radioactive material. For a discussion of the Price Anderson Nuclear Industries Indemnity Act, which provides a subsidy to companies licensed to operate nuclear power plants, see Subsidyscope's risk transfers page.

Federal Electricity Programs

The previous section briefly discussed the primary sources of energy and some of the specific subsidies the U.S. government conveys to those industries. Electricity is an example of a secondary power source produced from the primary energy sources discussed above. Electricity is neither renewable nor non-renewable; rather the sources from which it originates can be either.[49] As Figure 2 below illustrates, most of the electricity in the U.S. is generated from coal, followed by natural gas and nuclear power.[50] While the federal government's subsidization of private electricity generators is captured in the subsidies provided to producers of primary energy sources (such as coal), the federal government also has several programs that directly support electricity production, transmission, distribution and consumption. For example, the government directly provides relatively low cost electricity in certain areas, provides loans and tax exemptions to some electricity producers and funds electricity-related research and development. These subsidies are discussed in more detail below.

Figure 2: U.S. Electric Power Sector Energy Consumption, by Primary Source, 2008



Source: Subsidyscope analysis of data from Energy Information Administration, "Annual Energy Review 2008." June 2009. Table 2.1f. p. 45.

Note:
Net electricity imports comprise 0.3 percent of the fuels consumed to produce electricity.

The federal government owns or implicitly backs several electricity-producing utilities, including the Federal Power Marketing Administrations (PMAs), which include the Bonneville Power Administration (BPA), the Western Area Power Administration, the Southwestern Power Administration, the Southeastern Power Administration and the Tennessee Valley Authority (TVA). These utilities are statutorily obligated to provide below-market-cost power to their beneficiaries. In doing so, they provide electricity to state and local utilities or cooperatives which then sell the power at a reduced cost to residential or commercial customers.[51]

Among the most common government mechanisms to support electric utilities is providing access to

capital with reduced interest rates. As the EIA explains, "[t]he benefits derive from the Federal utilities' ability to borrow directly from the Treasury, sell bonds to the public in the case of TVA, or assume payment of debt obligations of third parties in the case of BPA, at interest rates that reflect investors' perception that such obligations are guaranteed by the Federal government."[52] The credit rating agencies recognized by the Securities and Exchange Commission indicate that this perception improves the PMA's and TVA's creditworthiness.[53]

Additionally, publicly-owned utilities benefit from the ability to borrow at reduced interest rates through the issuance of tax-exempt debt. In some cases, they issue the debt themselves, as the TVA does. In other cases, state and municipal utilities may issue tax-exempt debt on behalf of third parties, such as to utilities for pollution control equipment (a tax expenditure that is listed on our tax subsidies page). In addition to these tax subsidies, electric cooperatives and publicly-owned utilities are tax-exempt and therefore receive an implicit subsidy.[54] However, this subsidy is not calculated nor presented by the government, and therefore the tax exemption is not included in this analysis.[55]

The federal government also indirectly supports electricity through loans and loan guarantees made by the U.S. Department of Agriculture's Rural Utilities Service (RUS) to rural electric cooperatives at low rates. Federal support of electricity loans and loan guarantees through the RUS programs totaled $21.9 billion from fiscal year 2002 to 2007.[56] For more information on those programs, see Subsidyscope's page on risk transfers in the energy sector.

Further, much of the benefits of federal spending on research and development (R&D) in the energy sector accrue to both private and federal electricity generators. The GAO found that over the 5 year period from fiscal years 2002 to 2007, electricity-related R&D grew by 35 percent (from $1.6 billion to $2.2 billion).[57] This includes funding for nuclear power (which received the most electricity-related R&D funding), fossil fuels and renewable programs.

Water

The previous sections focused on sources of energy. Another important element of the energy sector is that of water use for energy production and transportation. Water is a vital intermediate input to energy resource development in that it is used in extracting, refining, processing and transporting fuels. Understanding how water influences the energy sector can be important in understanding how the government may indirectly subsidize energy through water subsidies.

Water is a significant input to electric power generation. It is used directly, for example, to generate electricity at hydroelectric plants and indirectly at other electric generating facilities for cooling and emissions control. In many cases water is only temporarily used in the energy sector. Often, water is withdrawn from a source and, shortly thereafter, returned to that same source for further reuse. But in many cases, water is withdrawn and used in a way that either contaminates the water requiring further processing or disposal (such as coal mine tailings[58]) or otherwise removes water from further use from its original source (such as evaporation from a cooling tower or reservoir[59]).

Water is also a significant resource for energy transportation. By one estimate, almost 50 percent of the total tonnage moved through domestic waterways is coal and oil shipments which benefit from subsidized channel or port-deepening projects.[60]

To the extent water use is subsidized, the energy sector also benefits from these subsidies. However, Subsidyscope's analysis of the energy sector does not currently take water subsidies into account. First, there is a lack of data and quantification on federal spending and subsidies in the area of water for energy production and use. Secondly, spending on subsidy programs involving water used for energy is not classified by the federal government in a manner that allows for aggregation. These gaps in existing research as well as government recordkeeping point to an area in need of further

research.

1. Energy Information Administration (EIA). "Annual Energy Review 2008." June 2009. Washington, DC. p. 37. Department of Energy (DOE).
2. Subsidyscope analysis of FY2009 data in: Office of Management and Budget (OMB). "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 209.
3. Hong, B.D. and Slatick, E.R. "Carbon Dioxide Emission Factors for Coal." Energy Information Administration, Quarterly Report, January-April 1994. DOE/EIA. Washington, DC. August 1994. pp. 1-8; and Intergovernmental Panel on Climate Change. "IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 1." Table 1.4. pp. 1.23-1.24.
4. U.S. Environmental Protection Agency (EPA). "Transportation and Climate: Regulation and Standards." Last Updated: June 10, 2010.
5. Metcalf, Gilbert. "Federal Tax Policy Towards Energy." National Bureau of Economic Research Working Paper Series, No. W12568. Cambridge, MA. October 2006. p. 3.
6. Congressional Budget Office (CBO). "Should the Federal Government Sell Electricity?" November 1997, Washington, DC. p. 15.
7. Subsidyscope does not advocate for specific taxes or subsidies rather we provide these examples for context.
8. Subsidyscope. "The Federal Financial Footprint in Six Sectors." 2010. Forthcoming.
9. Btu is the abbreviation for British thermal unit; it is a precise measure of the heat content of fuels. It is the quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature that water has its greatest density (approximately 39 degrees Fahrenheit). See: EIA. "Apples, Oranges and Btu" Last updated: August 2008. Department of Energy.
10. EIA. "Annual Energy Review 2008." June 2009. Washington, DC. p. 9. DOE.
11. Ibid.
12. Population figures from the U.S. Bureau of the Census. 1950 population: U.S. Bureau of the Census. "Historical National Population Estimates: July 1, 1900 to July 1, 1999." June 2000. Washington, DC.; 2000 and 2008 populations: U.S. Bureau of the Census, Population Estimates Program. "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2008." Washington, DC.
13. EIA. "Apples, Oranges and Btu" Last updated: August 2008. DOE.
14. EIA. "Annual Energy Review 2008." June 2009. Washington, DC. p. v. DOE.
15. EIA. "Oil: Crude and Petroleum Products Explained: Use of Oil." Last updated: March 1, 2010. DOE.
16. Ibid.
17. These totals include crude oil, natural gas liquid petroleum, and other oils. See: EIA, "Petroleum Navigator: Supply and Disposition." Release Date: June 29, 2009. DOE.
18. EIA. "Annual Energy Review 2008." June 2009. Washington, DC. p. v. DOE.
19. EIA. "Oil: Crude and Petroleum Products Explained: Use of Oil." Last updated: March 1, 2010. DOE.
20. Subsidyscope analysis of FY2009 data in: OMB. "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 209.
21. Government Accountability Office (GAO). "Oil and Gas Royalties: The Federal System for Collecting Oil and Gas Revenues Needs Comprehensive Reassessment." September 2008. GPO: Washington, DC. p. 6.
22. Subsidyscope analysis of EIA. "Annual Energy Review 2008." Table 1.2, 1.3. June 2009. Washington, DC. pp. 7, 9. DOE.
23. Ibid., Table 6.1. p. 187. Calculation made based on net imports as a percentage of consumption.
24. Ibid., p. v.
25. EIA. "Natural Gas Navigator: Natural Gas Summary." Release Date: June 29, 1010. DOE.
26. EIA. "Natural Gas Explained: Use of Natural Gas." Last Updated: March 11, 2010. DOE.
27. Subsidyscope analysis of FY2009 data in OMB. "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 209.
28. EIA. "Coal Explained: Coal Imports and Exports." Last Updated: February 19, 2010. DOE.
29. EIA. "Annual Energy Review 2008." June 2009. Washington, DC. p. v. DOE.
30. Subsidyscope analysis of data from EIA: "Annual Energy Review 2008." Tables 8.4a. June 2009. Washington, DC. p. 239. DOE.
31. EIA. "Annual Energy Review 2008." Table 1.3. June 2009. Washington, DC. p. 9. DOE.
32. EIA. "What is the role of coal in the United States?" Last Updated: February 25, 2010. DOE.
33. Hong, B.D. and Slatick, E.R. "Carbon Dioxide Emission Factors for Coal." Energy Information Administration, Quarterly Report, January-April 1994. DOE/EIA. Washington, DC. August 1994. p. 1; and Intergovernmental Panel on Climate Change. "IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 1." Table 1.4. pp. 1.23-1.24.

34. EIA. "What is the role of coal in the United States?" Last Updated: February 25, 2010. DOE.
35. Subsidyscope analysis of FY2009 data in OMB. "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 209.
36. In "The Clean Energy Economy," The Pew Center on the States and the Pew Environment Group defines renewable energy as "renewable power from solar, wind, low-impact hydro, hydrogen fuel cells, marine and tidal, geothermal and small-scale biopower energy sources." The Pew Charitable Trusts. "The Clean Energy Economy." June 2009. Washington, DC. p. 12.
37. EIA. "Renewable Energy Explained." Last Reviewed: July 16, 2009. DOE.
38. EIA. "Annual Energy Review 2008." June 2009. Washington, DC. p. v. DOE.
39. EIA. "Renewable Energy Explained." Last Reviewed: July 16, 2009. DOE.
40. EIA. "Biofuels: Ethanol and Biodiesel Explained." Last Reviewed: January 26, 2010. DOE.
41. Ibid.
42. EIA. "Hydropower Explained." Last Reviewed: February 19, 2010. DOE.
43. EIA. "Wind Explained: Electricity Generation from Wind." Last Updated: February 19, 2010. DOE.
44. EIA. "Geothermal Explained: Use of Geothermal Energy." Last Updated: March, 2, 2010. DOE.
45. EIA. "What is the status of the U.S. nuclear industry?" Last Updated: December 14, 2009. DOE.
46. EIA. "Annual Energy Review 2008." June 2009. Washington, DC. p. v. DOE.
47. EIA. "What is the status of the U.S. nuclear industry?" Last Updated: December 14, 2009. DOE.
48. According to the EIA, "Nuclear power generation itself does not contribute to airborne emissions of carbon dioxide (CO2), a major greenhouse gas, although related activities such as the production of nuclear fuel for reactors do result in CO2 emissions." EIA. "What is the status of the U.S. nuclear industry?" Last Updated: December 14, 2009. DOE.
49. EIA. "Electricity Explained." Last Reviewed: January 26, 2010. DOE.
50. EIA. "Annual Energy Review 2008." June 2009. Table 2.1f. Washington, DC. p. 55. DOE.
51. Ibid.
52. Ibid.
53. Ibid.
54. Ibid., p. 57-58.
55. The Treasury and the Joint Committee on Taxation do not estimate the tax exemption of electric cooperatives as a tax expenditure.
56. GAO. "Federal Electricity Subsidies." October 2007. GAO-08-102, p. 5.
57. Ibid., p. 2-3.
58. Commission on Geosciences, Environment and Resources. "Coal Waste Impoundments: Risks, Responses, and Alternatives." 2002. p. 23.
59. U.S. Geological Survey. "Thermoelectric-power water use." Last updated: March 30, 2010.
60. Koplow, Doug. "Federal Fossil Fuel Subsidies." Annual Review of Energy and Environment. 2001. Vol. 26. p. 369.

Last updated September 9, 2010.

Limitations of Energy Sector Data

Subsidyscope relies solely on government figures to estimate subsidies and spending on programs that are likely to contain a subsidy. Subsidyscope recognizes that government data can be of poor quality and, in particular, may not include some types of subsidies. The data may also contain gaps that prevent allocating published subsidy data to recipient sectors. All of these limitations can result in omissions of federal support that may, nonetheless, influence markets. Below, Subsidyscope presents examples of these limitations with respect to the energy sector.

Source of possible subsidy	Current constraints	Possible solutions
ENERGY-RELATED TAX EXPENDITURES		
Examples: • Accelerated depreciation of machinery and equipment. • Foreign tax credit	• Estimates by two separate entities (Treasury and JCT) sometimes differ by a large amount. • Re-estimates of tax expenditure figures based on actual tax returns are not provided to the public for comparison to previous tax expenditure estimates. • Many tax expenditure provisions are aggregated at a level that makes breaking out benefits to the energy sector, and within the energy sector, impossible.	• The government could routinely calculate and describe the differences between Treasury and JCT tax expenditure estimates. • Treasury could supply data allowing accurate apportionment of current aggregated tax subsidy estimates.
CREDIT SUBSIDIES BENEFITTING ENERGY		
Examples: • Export Import Bank loans/loan guarantees • Domestic credit support for energy infrastructure	• Federal subsidy estimates exclude loan administration costs and discount expected cash flows using a risk-free rate rather than a rate reflecting market risk.	• Government agencies could expand disclosure of credit terms and performance and incorporate administrative costs and appropriate discount rates into subsidy estimates.
SUBSIDIZED USER FEES FOR ENERGY-RELATED GOODS AND SERVICES		
Examples: • Inland waterway system	• Infrastructure-related subsidies require	• Government agencies could provide estimates of the use of

construction and maintenance (used by bulk coal and oil) • Reclamation and remediation of abandoned extraction and processing sites • Long-term management of nuclear waste	allocation across multiple beneficiaries. • Government estimates for reclamation and remediation by sector either do not exist, or are subject to a great deal of uncertainty. • Cost adequacy estimates may not be financially or actuarially sound.	government infrastructure and services by sector, and corresponding payments with assumptions that are clear and regularly updated.

INDEMNIFICATION

Examples: • Legislative caps on liability for energy-related risks such as nuclear accidents • Potentially inadequate coverage for other risks, such as catastrophic dam failure	• No government data source evaluates these exposures in a consistent and systematic way.	• GAO or other interested parties could establish a list of areas where the government is directly or indirectly indemnifying private parties from liability. • The government could supply data allowing accurate apportionment of these subsidies to recipient sectors.

CONSUMPTION MANDATES

Examples: • Government rules on certain energy consumption and vehicle purchases subsidize producers through higher consumer costs rather than through government outlays	• No recurring government data on the economic impact of these rules.	• EIA or the relevant regulating entity could issue periodic assessments of the market effect of such rules.

Last updated September 9, 2010.

Direct Expenditures in the Energy Sector

The federal government directly funds companies, universities and other organizations with grants and contracts to provide energy-related goods and services on its behalf. Through such funding, the U.S. Department of Energy (DOE) and other agencies provide resources that support both producers and consumers of energy as well as users of energy-related research.

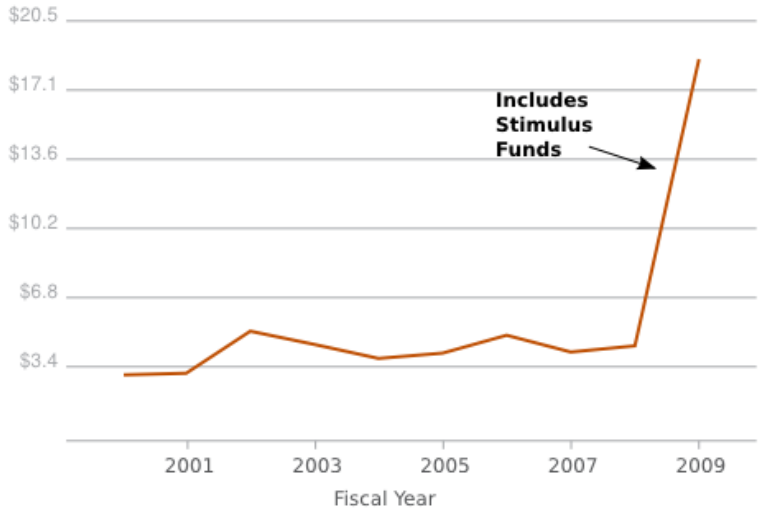
Unfortunately, there is little data available to determine how much of the federal spending on energy-related grants and contracts may constitute a subsidy to this sector. In the absence of this information, Subsidyscope provides data on all those direct expenditure programs that are most likely to contain a subsidy in order to better estimate the upper bound of government subsidies in this sector. Not all of the spending in these programs would properly be counted as a subsidy; in some cases, very little of what is spent on a program may be a subsidy. In many cases, especially for competitively-bid contracts, there may be no subsidy at all.

Direct expenditures are easier to measure than spending on other programs containing subsidies, such as tax expenditures or loan programs. However, users of this data should be aware that the federal data Subsidyscope collects from the government can sometimes be of poor quality, particularly in that there may be omissions.[1]

Based on available federal data for fiscal year 2009, the federal government granted a total of $18.6 billion directly to companies or organizations carrying out energy-related work that Subsidyscope deems likely to contain a subsidy. This is just under 3 percent of all government grants over that time period ($716.8 billion). Also during fiscal year 2009, contracts to entities in the energy sector totaled $21.3 billion, about 4 percent of all government contracts ($523 billion). Of those energy contracts, nearly 20 percent, or $4.3 billion, were not competed. Subsidyscope considers non-competed contracts as more likely to contain a subsidy than competed contracts.

Subsidies through Grants

Figure 1: Direct Expenditures in the Energy Sector FY2000-2009 (billions of nominal dollars)



Source: Subsidyscope analysis of data from USAspending.gov. Estimates are in nominal dollars and reflect the data as they appear in USAspending.gov at the time of this analysis.

Note:
Data presented are obligations to programs that Subsidyscope deems likely to contain a subsidy. All grant programs in Subsidyscope's definition of the energy sector are included.

Based on Subsidyscope's review, all federal grant programs in the energy sector (see Table 1 at the bottom of the page) were determined to potentially contain a subsidy (see Section B. 4. of our methodology). However, even if a grant program does include a subsidy component, estimates of the actual subsidy are often not calculated or made available. Given these limitations, we present all federal spending on programs that may contain a subsidy, as it is the upper bound of what might potentially be a subsidy for the energy sector.

Almost 72 percent of the energy-related dollars spent through grant programs in fiscal year 2009 were carried out by DOE. Other agencies that implement energy-related programs include the U.S. Department of Agriculture, the Department of Housing and Urban Development, the Department of Health and Human Services, the Department of the Interior and the Nuclear Regulatory Commission. In fiscal year 2009, the five largest grant programs accounted for over 90 percent of the total grants in the energy sector. These programs are briefly described below. See Table 1 at the bottom of the page for a complete list of programs that Subsidyscope deems likely to contain a subsidy and their corresponding fiscal year 2009 funding amounts.

The largest grant in the energy sector for fiscal year 2009 was DOE's Weatherization Assistance for Low-Income Persons Program (WAP), which was allotted $5.6 billion that year. In fiscal year 2009, this program received almost $5.4 billion above previous funding levels as part of the American Reinvestment and Recovery Act of 2009 (ARRA), also known as "stimulus funds." This more than twentyfold increase in funding for that program helps explain the spike in direct expenditures depicted in Figure 1, above. Funding in fiscal year 2008, before the spike, was $221 million and the Catalogue of Federal Domestic Assistance projects that funding in fiscal year 2010 will return to the range of $225 million.[2] DOE funds WAP in order to improve the energy efficiency of low-income homes through the installation of weatherization materials such as attic insulation, caulking, weather-stripping and modifications to heating and cooling systems.[3] WAP funds are directed to states or state agencies, who in turn administer the funds to eligible beneficiaries.

The second largest grant program in the energy sector for fiscal year 2009 was the Low-Income Home Energy Assistance Program (LIHEAP), administered by the U.S. Department of Health and Human Services (HHS). The program received $5.1 billion in fiscal year 2009, up from $2.6 billion in

fiscal year 2008.[4] LIHEAP grants go to states and other jurisdictions to assist households with energy costs. A portion of these funds may also be used for weatherization of homes.[5]

The third largest grant program in fiscal year 2009, which received a more than hundredfold increase in one-time stimulus funds, is the State Energy Program. In fiscal year 2009, this program was funded at $3.2 billion, up from $30 million in fiscal year 2008. The program's funding is projected to decrease back down to around $70 million in fiscal year 2010.[6] This program gives financial and technical assistance to states for energy efficiency and conservation projects with the goal of reducing fossil fuel emissions, reducing energy use and increasing energy efficiency.[7]

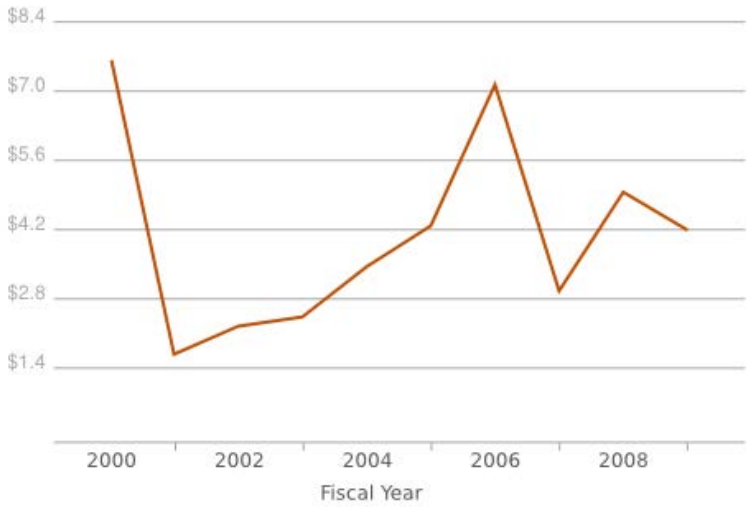
The fourth largest energy-related grant program in fiscal year 2009 was DOE's Energy Efficiency and Conservation Block Grant Program (EECBG), which was entirely funded by ARRA. This program, which received $1.5 billion in fiscal year 2009, provides funding to states through block grants and has the same objectives as the State Energy program: to reduce fossil fuel emissions, reduce energy use and increase energy efficiency in various sectors.[8]

The fifth largest energy-related grant program in fiscal year 2009 was the Office of Science Financial Assistance Program, which received $1.4 billion that year. This program funds research in the basic sciences and advanced technology concepts relating to energy. If funds allocated through ARRA were not included in this analysis, this would be the largest DOE grant program in the energy sector (excluding the HHS grant above), indicating that research is typically one of the largest beneficiaries of DOE energy-related grants. While funding levels for some of the programs mentioned previously decrease in fiscal year 2010, funding for the Office of Science Financial Assistance program is likely to remain at a consistent level in fiscal year 2010.[9]

Subsidies through Contracts

In addition to awarding grants, the government directly contracts with other organizations to provide energy-related goods and services, such as fuel, infrastructure maintenance and research. Under a contract, a subsidy occurs when the government pays more than fair market value for a good or service. In many cases it is difficult to determine when a subsidy is included, as the fair market value may be a matter of opinion.

Figure 2: Non-competed Contracts in the Energy Sector FY2000-2009 (billions of nominal dollars)



Source: Subsidyscope analysis of data from USAspending.gov. Estimates are in nominal dollars and reflect the data as they appear in USAspending.gov at the time of this analysis.

Note:
Subsidyscope believes that government spending on non-competed contracts is actually more consistent during this time period than the figure represents, and that the dips reflect poor data resulting from reporting variation, rather than actual decreases in energy-related contracts. See the text below for additional information.

Subsidyscope does not attempt to determine which specific contracts include a subsidy or measure what the subsidy may be. We do presume, however, that competed contracts—contracts that are subject to an open bidding process—are generally less likely to have a subsidy component, even though the bidding process may include certain preferences.

Subsidyscope's focus on non-competed contracts reflects the fact that the federal government generally prefers agencies to compete contracts because competition is expected to result in lower costs and/or better quality goods and services.[10] In contrast, non-competed contracts are generally assumed to be more likely to cost the government more than the fair market value and may be scrutinized solely on the basis that there is not clear justification for why they were not competed.

While all 13,823 non-competed contracts in the energy sector in fiscal year 2009 totaled $4.3 billion, the top 100 contracts totaled nearly $3.7 billion. Seven of these contracts exceeded $100 million each, with recipients including oil and gas companies, a foreign contractor and the Tennessee Valley Authority, among others.

Subsidyscope has previously determined that there can be problems with the quality of the contracts data that are reported by agencies to USAspending.gov. In order to sort government contracts by economic sector, Subsidyscope uses the North American Industry Classification System (NAICS) codes to match contracts to the appropriate economic sector, or Product Service Codes if NAICS codes are not available. (See Section C of Subsidyscope's methodology here for more on how contracts are organized by sector.)

Specifically, for the data presented in Figure 2 above, Subsidyscope found that there is significant variation in agencies' use of NAICS codes when reporting contracts to USAspending.gov over the ten-year period from fiscal year 2000 to 2009. This trend indicates a general underreporting of contracts in the energy sector, and is also likely responsible for the large drop in the reported number of non-competed contracts in the energy sector from fiscal year 2000 to 2001 and the spike in contracts in fiscal year 2005. Subsidyscope believes that the trend is actually more consistent during this time period than Figure 2 represents, and that the dips reflect poor data resulting from reporting variation, rather than actual decreases in energy-related contracts.

To access Subsidyscope's search interfaces for direct expenditures data from the federal government's USAspending.gov Web site, click here for grants and here for non-competed contracts. The table below provides an aggregate summary of the grants made to each program in the energy sector in fiscal year 2009, retrieved from Subsidyscope's searchable database of grants.

Table 1: Energy Sector Direct Expenditure Programs, FY 2009

CFDA #	CFDA Program Title	FY 2009 $
81.042	Weatherization Assistance for Low-Income Persons	$5,613,959,073
93.568	Low-Income Home Energy Assistance	$5,098,501,072
81.041	State Energy Program	$3,238,118,207
81.128	Energy Efficiency and Conservation Block Grant Program (EECBG)	$1,495,369,254
81.049	Office of Science Financial Assistance Program	$1,362,370,873
81.089	Fossil Energy Research and Development	$513,941,221

81.087	Renewable Energy Research and Development	$470,336,632
81.121	Nuclear Energy Research, Development and Demonstration	$208,832,514
81.086	Conservation Research and Development	$198,794,179
81.122	Electricity Delivery and Energy Reliability, Research, Development and Analysis	$118,190,330
10.312	Biomass Research and Development Initiative Competitive Grants Program (BRDI)	$50,089,775
10.868	Rural Energy for America Program	$49,790,376
81.117	Energy Efficiency and Renewable Energy Information Dissemination, Outreach, Training and Technical Analysis/Assistance	$38,885,086
81.127	Energy Efficient Appliance Rebate Program (EEARP)	$29,750,800
81.129	Energy Efficiency and Renewable Energy Technology Deployment, Demonstration and Commercialization	$21,775,078
81.065	Nuclear Waste Disposal Siting	$15,893,400
14.506	General Research and Technology Activity	$13,962,246
14.318	Assisted Housing Stability and Energy and Green Retrofit Investments Program (Recovery Act Funded)	$11,750,000
77.008	U.S. Nuclear Regulatory Commission Scholarship and Fellowship Program	$10,249,374
10.854	Rural Economic Development Loans and Grants	$10,214,156
10.859	Assistance to High Energy Cost Rural Communities	$9,667,519
81.003	Granting of Patent Licenses	$6,602,809
10.775	Renewable Energy Systems and Energy Efficiency Improvements Program	$4,577,245
15.656	Recovery Act Funds - Habitat Enhancement, Restoration and Improvement.	$3,624,004
77.006	U. S. Nuclear Regulatory Commission Nuclear Education Grant Program	$3,194,065
81.057	University Coal Research	$2,069,376
81.036	Inventions and Innovations	$1,704,060
77.007	U.S. Nuclear Regulatory Commission Minority Serving Institutions Program (MSIP)	$1,105,000
14.421	Alaska Coastal Marine Institute	$730,079
77.009	U.S. Nuclear Regulatory Commission Office of Research Financial Assistance Program	$75,000
14.422	Louisiana State University (LSU) Coastal Marine Institute (CMI)	$48,531
81.079	Regional Biomass Energy Programs	$6,641
10.865	Biorefinery Assistance	$0
81.105	National Industrial Competitiveness through Energy, Environment, and Economics	-$25,742
81.119	State Energy Program Special Projects	-$470,064
10.078	Bioenergy Program (BIO)	not reported
10.685	Community Wood Energy Program	not reported
10.686	Forest Biomass for Energy	not reported
10.857	State Bulk Fuel Revolving Fund Grants	not reported
15.148	Tribal Energy Development Capacity Grants	not reported
15.425	Offshore Research Technology Center (OTRC) Texas Engineering Experiment Station (TEES)	not reported
15.819	Energy Cooperatives to Support the National Coal Resources Data System (NCRDS)	not reported

23.011	Appalachian Research, Technical Assistance, and Demonstration Projects	not reported
78.004	Commodity Futures Reparations Claims	not reported
81.131	Expand and Extend Clean Coal Power Initiative	not reported
81.132	Geologic Sequestration Site Characterization	not reported
81.133	Geologic Sequestration Training and Research Grant Program	not reported
81.134	Industrial Carbon Capture and Storage (CCS) Application	not reported
81.135	Advanced Research and Projects Agency - Energy Financial Assistance Program	not reported
Total		**$18,603,682,169**

Source: Subsidyscope analysis of data from USAspending.gov. Table excludes loans and loan guarantees.

Note:
Some programs report negative totals for FY 2009. This reflects a downward adjustment to obligations made in previous years.

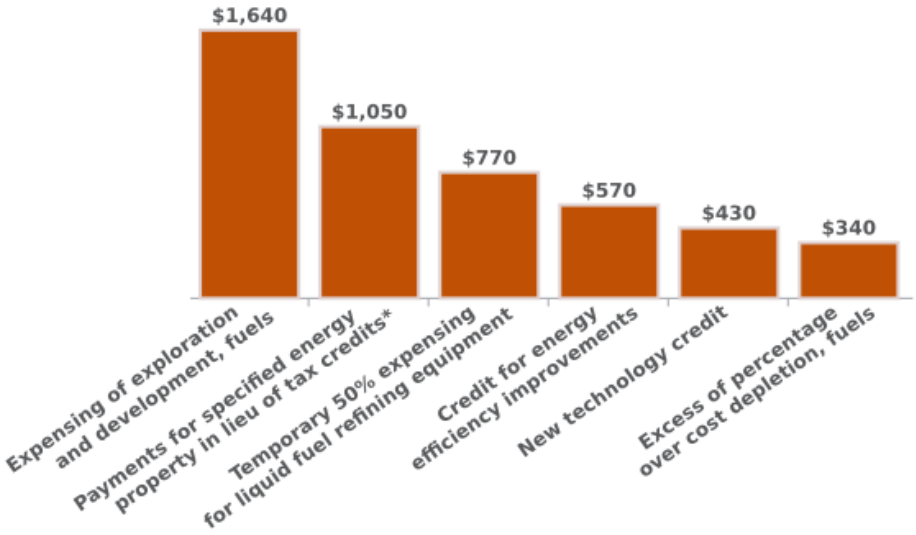
1. *See Subsidyscope's Web page on data quality: "Federal Records Missing Important Data."*
2. *Catalog of Federal Domestic Assistance. Weatherization Assistance for Low-Income Persons.*
3. *Ibid.*
4. *Subsidyscope analysis of USAspending.gov.*
5. *Catalog of Federal Domestic Assistance. Low-Income Home Energy Assistance.*
6. *Catalog of Federal Domestic Assistance. State Energy Program.*
7. *Ibid.*
8. *Catalog of Federal Domestic Assistance. Energy Efficiency and Conservation Block Grant Program (EECBG).*
9. *Catalog of Federal Domestic Assistance. Office of Science Financial Assistance Program.*
10. *Department of Energy. "Competition in Contracting Guide, version 2." p. 2.*

Last updated September 9, 2010.

Tax Expenditures in the Energy Sector

The federal government heavily relies on the tax code to implement policy in the energy sector. In fiscal year 2009, the estimated revenue loss in the sector from tax expenditures totaled nearly $6.3 billion.[1] Tax expenditures are government revenue losses resulting from provisions in the tax code that allow a taxpayer or business to reduce their tax burden by taking certain deductions, exemptions, exclusions, preferential rates, deferrals or credits. Tax expenditures have a similar effect on the federal deficit as government spending. They can also have effects on recipients that are similar to grants or other types of subsidies. For instance, if the government wants to encourage people to buy solar panels for their homes, it could send checks to those who bought panels or offer tax breaks after the panels have been purchased.[2]

Figure 1: Top Tax Expenditures by Revenue Loss FY 2009 ($ millions)



Source: Subsidyscope analysis of Analytical Perspectives. OMB. Budget of the U.S. Government, Fiscal Year 2011. p. 209.

**This program is not a typical tax expenditure but is estimated in a footnote of the Tax Expenditure Budget in Analytical Perspectives. See p. 213.*

There are 24 specific tax expenditures identified by the U.S. Department of the Treasury (Treasury) as serving the energy sector, though only a few of these provisions account for most of the revenue lost to tax subsidies.[3] The top six of these tax expenditures totaled $4.8 billion, or over 75 percent of all energy-related tax expenditures in fiscal year 2009.[4] Some tax expenditures such as the allowance for accelerated depreciation and the foreign tax credit, that benefit businesses broadly across the economy, including the energy sector, are not included in these aggregate estimates.[5]

Subsidyscope divided the energy tax expenditures reported by Treasury into four categories: those

that support fossil fuels, those that support renewable or alternative fuels (e.g., bio-diesel), those that support energy efficiency or conservation, and those that are 'multi-use,' in that they are used in the energy sector but are available across various industries, and cannot be placed in one of the first three categories. The federal government provided incentives through the tax code of $3.2 billion to support fossil fuels; $1.5 billion to support renewable and alternative fuels; $1.2 billion to encourage energy efficiency or conservation; and $430 million for multi-use tax expenditures, in fiscal year 2009 (see Table 1). All four categories combined resulted in an estimated $6.3 billion loss to government revenue in fiscal year 2009, a slight increase over the revenue loss in recent years. Note that estimates of the revenue lost to tax expenditures change each year and can vary dramatically depending on legislative actions and economic conditions. Energy sector tax expenditures averaged roughly $4 billion per year over fiscal years 2000 through 2008, and fossil fuels have been the largest beneficiary of tax subsidies in the time period for which Subsidyscope has data. (See Box 1 for historical tax expenditure trends by category.)

Listed below are the tax expenditures reported by the Treasury, and assigned to the energy sector in the fiscal year 2011 edition of the *Analytical Perspectives* supplement to the President's Budget; the categorization presented in the table has been added by Subsidyscope.

Table 1: Energy Related Tax Expenditures for Individuals and Corporations, FY 2009

Tax Expenditure	FY 2009 ($ millions)
SUPPORT FOSSIL FUELS	
Expensing of exploration and development costs, fuels	$1,640
Temporary 50% expensing for equipment used in the refining of liquid fuels	$770
Excess of percentage over cost depletion, fuels	$340
Credit for investment in clean coal facilities	$180
Natural gas distribution pipelines treated as 15-year property	$80
Capital gains treatment of royalties on coal	$70
Alternative fuel production credit[1]	$60
Amortize all geological and geophysical expenditures over 2 years	$40
Exception from passive loss limitation for working interests in oil and gas properties	$20
Total	**$3,200**
SUPPORT RENEWABLE FUELS AND ALTERNATIVE FUELS	
Payments for specified energy property in lieu of tax credits[2]	$1,050
Energy investment credit	$270
Credit for holding clean renewable energy bonds	$70
Alcohol fuel credits	$50
Bio-Diesel and small agri-biodiesel producer tax credits	$30
Total	**$1,470**
ENCOURAGE ENERGY EFFICIENCY OR CONSERVATION	
Credit for energy efficiency improvements to existing homes	$570
Exclusion of utility conservation subsidies	$140

Tax credit and deduction for clean-fuel burning vehicles	$130
Credit for energy efficient appliances	$130
Credit for residential purchases/installations of solar and fuel cells	$110
Allowance of deduction for certain energy efficient commercial building property	$60
Credit for construction of new energy efficient homes	$30
Qualified energy conservation bonds	$0
Total	**$1,170**

MULTI-USE

New technology credit	$430
Exclusion of interest on energy facility bonds	$10
Deferral of gain from dispositions of transmission property to implement FERC restructuring policy	-$10[3]
Total	**$430**
Grand Total	***$6,270***[4]

Source: Subsidyscope analysis of FY2009 data in Analytical Perspectives. OMB. Budget of the U.S. Government, Fiscal Year 2011. p. 209.

Notes:

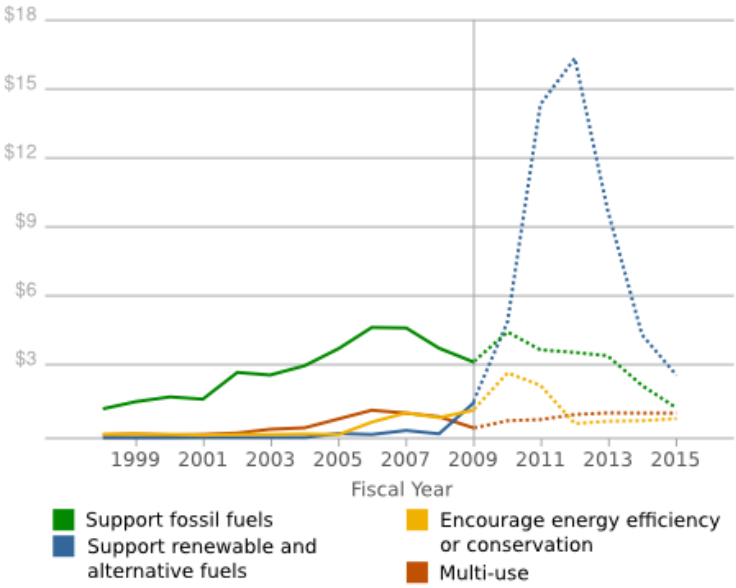
1. *The Energy Information Administration (EIA) notes that as of 2008, the alternative fuel production credit was primarily used for refined coal, therefore Subsidyscope classifies it as supporting fossil fuels. See EIA, "Federal Financial Interventions and Subsidies in Energy Markets 2007," April 2008. p. 117.*
2. *Subsidyscope adds this program as a separate line item while the Treasury includes it as a footnote. See more on this program in the description below.'*
3. *This negative tax expenditure represents a loss to properties (a gain to the Treasury) that offsets prior years' gains to the properties.*
4. *Summing tax expenditures often provides a reasonably good estimate for the total cost of groups of tax expenditures, though it does not capture the potential interactions among tax expenditures if any single one is changed or repealed.*

Tax Expenditures in the Energy Sector

Box 1: Energy Tax Expenditures over Time

At the aggregate level, U.S. energy tax incentives have changed over time. For example, before fiscal year 2010, renewables were not heavily subsidized through the tax code in comparison to fossil fuels (see the figure below); however, after fiscal year 2010, tax subsidies for renewables are projected to increase significantly in comparison to the other categories, peaking in fiscal year 2012, and decreasing after that.

Energy Related Tax Expenditures ($ billions)



Source: Subsidyscope analysis of Analytical Perspectives, OMB. President's Budget, Fiscal Years, 2000-2011. Numbers provided are from the most recent estimate available.

Note:
Tax expenditure estimates and projections are based on current law as of December 31, 2009. Includes 'Payments in Lieu of Tax Credits' in the FY2009-15 estimates.

Various federal taxes and exceptions to such taxes are specifically linked to energy production, consumption or efficiency, such as the income tax credit for energy efficiency improvements or the excise taxes on gasoline and diesel fuels. Subsidyscope relies on the Treasury's estimates of tax expenditures in the corporate and individual income tax, which are compiled in the *Analytical Perspectives* of the President's Budget. (See Subsidyscope's page here for more on the differences between existing government estimates and on tax expenditures, generally.)

So far, Subsidyscope has not included excise taxes, or reductions in excise taxes, in our tally of subsidies because Subsidyscope relies on the estimates of tax expenditures presented in the President's Budget, which do not include excise tax expenditures.[6] Subsidyscope intends to examine the issue of excise taxes and exceptions to excise taxes in the future. Such taxes and exceptions to those taxes exist in the energy sector. For example, the ethanol tax credit, which is an exception to the excise tax on motor fuel, is estimated to have reduced excise taxes by $3 billion in fiscal year 2007 and is expected to exceed $5 billion in reduced payments by fiscal year 2010, according to the Energy Information Administration.[7]

The following section discusses the energy-related income tax subsidies that resulted in the greatest loss of revenue to the federal government in fiscal year 2009. For that year, these six tax expenditures accounted for more than three-quarters of the estimated revenue loss to the Treasury.

Description of Top Energy-Related Tax Expenditures

Expensing of Exploration and Development Costs

In fiscal year 2009, the largest tax expenditure in the energy sector was the allowance of expensing of exploration and development costs of fuels, with an estimated revenue loss of $1.6 billion.[8] Some of the costs of exploration and development of oil, gas and certain other fuels, also called "intangible drilling costs" (IDCs), are part of the incidental and necessary expenditures of preparing a site for oil production. These costs include labor and repairs to drilling equipment, among other expenditures. Under a normal income tax, the rules would allow depreciation of these costs before the calculation of

taxes owed, but not full expensing. This ability to immediately expense exploration and development costs decreases the amount of income that can be taxed, thus creating a subsidy.[9] Originally implemented in 1916, this subsidy is based on the rationale that it reduces uncertainty for oil companies and encourages exploration, which can increase domestic production, reduce imports and enhance energy security.[10]

In its assessment of this expensing provision, the Congressional Research Service (CRS) notes that this subsidy may reduce dependence on imported oil in the short run, but it may deplete the nation's oil resources more quickly in the long run. The Congressional Budget Office (CBO) notes that the rationale for this tax subsidy has shifted over time, saying that earlier advocates argued that the costs of exploration and development were ordinary operating expenses, while more recently proponents also argue that oil and natural gas are strategic natural resources essential to the nation's security.[11]

Payments for Specified Energy Property in Lieu of Tax Credits

The American Reinvestment and Recovery Act of 2009 (ARRA) of 2009 authorized a program through which owners of certain energy property, such as wind farms, who place the property into service for renewable energy projects can receive cash grants in lieu of investment tax credits (ITCs). The Treasury estimates the effect of this grant on outlays to be $1.1 billion in fiscal year 2009 with further increases in fiscal years 2010 and 2011.[12]

Administered by the Treasury with assistance from the Department of Energy (DOE), the program's guidance notes that demand for investment tax credits had diminished. By offering grants in lieu of tax credits, firms can receive a benefit regardless of their tax liability. According to the guidance, the program will boost investment in renewable energy projects, in order to create jobs in the near-term and expand clean and renewable energy in the long-term.[13]

While this program is not presented in the table of energy sector tax expenditures in the President's Fiscal Year 2011 Budget, it is presented in a footnote to the table.[14] Subsidyscope included the program in the tax expenditure total because its revenue effects are calculated by the Treasury in this footnote. Further, OMB determined that this grant is not considered federal financial assistance,[15] and as such it will not ultimately be reported to USAspending.gov and captured in Subsidyscope's database of direct expenditures. However, the program differs from a standard tax expenditure in that the beneficiary information is publicly available on the Treasury Web site.[16]

Temporary 50 Percent Expensing for Equipment Used in the Refining of Liquid Fuels

The Energy Policy Act of 2005 temporarily allows refineries to expense half of the cost of qualified refinery equipment, with no limit on the amount of the deduction. The remaining half of the cost is subject to normal tax depreciation rules.[17] For fiscal year 2009, the estimated revenue loss for this temporary expensing provision was $770 million.

Credit for Energy Efficiency Improvements to Existing Homes

As part of the Energy Policy Act of 2005, Congress passed provisions allowing homeowners to claim a tax credit if they retrofit their homes with energy efficient materials that reduce heat loss in the winter and cooling loss in the summer or if they use more energy efficient heating or cooling systems.[18] In fiscal year 2009, the estimated revenue loss for subsidizing energy efficiency improvements to existing homes through this tax credit totaled $570 million.

New Technology Credit (Also Called the Energy Production Credit)

In fiscal year 2009, the new technology credit cost the government an estimated $430 million. The President's FY2011 budget notes that this credit is for "certain electricity produced from wind energy, biomass, geothermal energy, solar energy, small irrigation power, municipal solid waste, or qualified hydropower and sold to an unrelated party. In addition to the electricity production credit, an income tax credit is allowed for the production of refined coal and Indian coal at qualified facilities."[19]

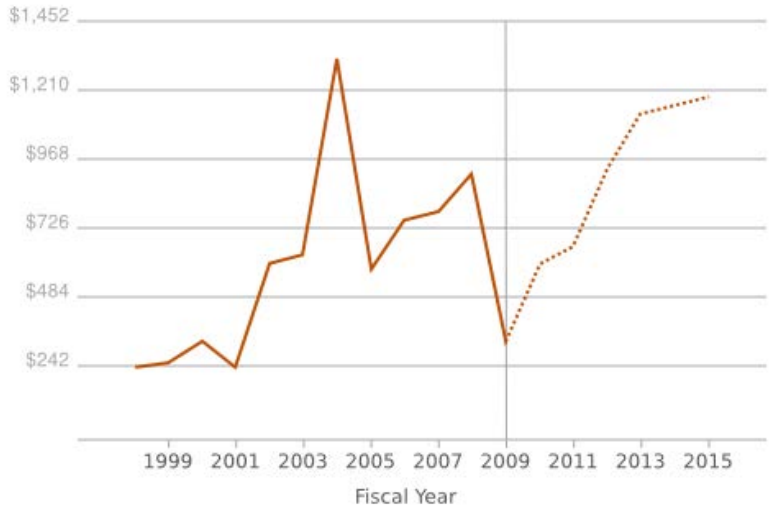
Excess of Percentage Over Cost Depletion

In addition to expensing intangible drilling costs, certain natural resource extraction companies may

be able to deduct a portion of their gross income related to the use and depletion of the asset itself (e.g., oil or mineral reserve) in order to recover part of their capital investment in the resource. In fiscal year 2009, the estimated revenue loss for this tax subsidy was $340 million.[20] It has been much higher in past years, peaking at over $1.2 billion in 2004, and is projected to increase again after fiscal year 2009 (see Figure 2).

Normally, accounting practices allow firms to deduct the cost of the depletion of assets from gross income before calculating taxes owed; this allows for the recovery of the capital investment over the period the assets produce income. However, under percentage depletion, firms may deduct a fixed percentage of the "gross income" or revenue they receive from the sale of the mineral. CRS notes that deducting costs this way typically means the deductions exceed the costs of the capital invested in acquiring and developing the reserve.[21] Similar to the expensing of exploration and development costs, this subsidy is created by allowing a reduction in taxable income higher than that which would be allowed under normal accounting practices. The subsidy in this case is the difference between what the firm would have received using cost depletion and percentage depletion.[22]

Figure 2: Percentage Depletion Allowancefrom FY 1998 to FY 2015 ($ millions)



Source: Subsidyscope analysis of Analytical Perspectives, OMB. President's Budget, Fiscal Years, 2000-2011. Numbers provided are from the most recent estimate available.

Note:
Tax expenditure estimates and projections are based on current law as of December 31, 2009.

Broad, Cross-sectoral Tax Expenditures

There are various tax expenditures that are used in the energy sector but are available to industries across the economy. The revenue loss of these provisions is not always calculated by the government at the sector level. Where estimates are available, such as for the "Credit for holding clean energy renewable bonds," Subsidyscope provides them and includes them in Table 1. For others, such as accelerated depreciation, there is some research indicating that the benefits to the energy sector are disproportionately higher than other sectors that are less capital intensive. Unfortunately, reliable estimates of the portion that goes to the energy sector are not yet available.

Accelerated Depreciation and Foreign Tax Credit

When a business asset loses value over time it is said to depreciate; such a loss is considered one of the costs of doing business. Special tax depreciation rules can be used to encourage or discourage some types of investments over other investments, which introduces a subsidy. The U.S. tax code

allows for accelerated depreciation of certain capital, which means that the tax depreciation is more rapid than economic depreciation. Because the energy sector is very capital and infrastructure intensive, it is likely that it benefits from this tax expenditure to a higher proportion than its share of GDP. In fact, experts note that nuclear power and electricity generated from renewable sources receive particularly generous tax treatment from accelerated depreciation.[23]

Unfortunately, the government does not currently publish energy-specific tax expenditure estimates of accelerated depreciation so these subsidies are omitted from our estimate of tax expenditure subsidies. To remedy this, Subsidyscope has requested data from the IRS that will allow us to analyze accelerated depreciation by sector and, eventually, include these benefits in our totals for this and other sectors.

Companies in the energy sector, as well as in other sectors, may also benefit from tax provisions such as the Foreign Tax Credit. This tax provision allows companies to take a credit on their U.S. income tax return for certain foreign taxes paid, in order to reduce double taxation.[24] Similar to accelerated depreciation, the government does not currently publish energy-specific tax expenditure estimates of the foreign tax credit so these subsidies are omitted from our estimate of tax expenditure subsidies. Subsidyscope is exploring ways to reliably identify and assign this tax advantage to individual sectors.

1. *Number derived by adding up the tax expenditures in Table 1. See table notes for more information on summing tax expenditures and what it is included in this number.*
2. *In order to truly compare tax expenditure estimates with budget transfers, one should convert tax expenditures into an outlay equivalent, or the amount of money that would be required to deliver the same after-tax amount of benefit to an individual or corporation. For more detail, see: Carasso, Adam, and Gene Steurle. "Tax Expenditures: Revenue Loss versus Outlay Equivalents." October 13, 2003. The Urban-Brookings Tax Policy Center.*
3. *Subsidyscope analysis of FY2009 data in Office of Management and Budget (OMB). "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 209.*
4. *Ibid.*
5. *Subsidyscope relies on the Department of the Treasury's (Treasury) tax expenditure estimates presented in the President's Budget; the Joint Committee on Taxation also estimates tax expenditures and has a different methodology for doing so. See this Subsidyscope page for more on these estimates and how they differ. Further, on energy tax expenditures in particular, some hold that there is no bright line between a "general" and "an energy-specific" tax policy, despite the classification in the budget of certain tax expenditures as being specific to energy. For a discussion of this, and general difficulties in producing precise subsidy numbers generally, see: Koplow, Doug. "EIA Energy Subsidy Estimates: A Review of Assumptions and Omissions." March 2010. Earth Track, Inc. Subsidyscope has requested data from the IRS that will allow us to analyze accelerated depreciation by sector. Currently we have no government estimate of how much the energy sector benefits from this tax subsidy, but it could potentially be in the billions.*
6. *Metcalf, Gilbert. "Using Tax Expenditures to Achieve Energy Policy Goals." National Bureau of Economic Research Working Paper Series. No. 13753. Cambridge, MA. January 2008. p. 6.*
7. *EIA. "Federal Financial Interventions and Subsidies in Energy Markets in 2007." April 2008. p. 22.*
8. *OMB. "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 209.*
9. *Congressional Research Service (CRS). "Tax Expenditures: Compendium of Background Material on Individual Provisions." Prepared for the United States Senate Committee on the Budget. December 2008. pp. 129-133.*
10. *Ibid., p. 132.*
11. *CBO. "Budget Options." February 2007. p. 295.*
12. *OMB. "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 213. Future years estimates are: $3,090 million in 2010; $4,460 million in 2011; $4,240 million in 2012; $2,360 million in 2013; $230 million in 2014; and $30 million in 2015.*
13. *U.S. Department of the Treasury, Office of the Fiscal Assistant Secretary. "Payments for Specified Energy Property in Lieu of Tax Credits under the American Recovery and Reinvestment Act of 2009." July 2009 and revised March 2010. p. 3.*
14. *The program is mentioned in Footnote 1 on page 213 of the Analytical Perspectives document accompanying the FY2011 budget. The text of the footnote refers to the 'Energy investment credit,' which is line 16 in Table 16-1. However, the number of the footnote appears to be accidentally listed with line 17 of that table.*
15. *U.S. Department of the Treasury. "ARRA Section 1603 –Grants For Specified Energy Property In Lieu of Tax Credits." Presentation by Ellen Neubauer. September 2009. p. 10.*

16. *As of August 17, 2010, Treasury shows nearly $5.2 billion had been granted to 1113 projects, see Treasury's spreadsheet for more information on recipients.*
17. *Holt, Mark and Glover, Carol. Congressional Research Service. "Energy Policy Act of 2005: Summary and Analysis of Enacted Provisions." March 8, 2006.*
18. *CRS. "Tax Expenditures: Compendium of Background Material on Individual Provisions." Prepared for the United States Senate Committee on the Budget. December 2008. p. 156.*
19. *OMB. "Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2011." p. 226.*
20. *This estimate is for fuel-related extractions only. There is a separate line item for "Excess percentage over cost depletion for nonfuel minerals" in the Analytical Perspectives, and it will be included in Subsidyscope's analysis of the Natural Resources Sector.*
21. *CRS. "Tax Expenditures: Compendium of Background Material on Individual Provisions." Prepared for the United States Senate Committee on the Budget. December 2008. p. 118.*
22. *Ibid., p. 120.*
23. *Metcalf, Gilbert. "Federal Tax Policy towards Energy." Tax Policy and the Economy. Vol. 21. August 2007. p. 157.*
24. *Internal Revenue Service. "Foreign Tax Credit." Last updated September 20, 2009.*

Last updated September 9, 2010.

Loans, Loan Guarantees and Other Risk Transfers in the Energy Sector

The federal government subsidizes certain energy related activities by assuming financial risk that would otherwise be borne by individuals, businesses or other organizations. Subsidyscope's review of federal data shows that in fiscal year 2008 about $6.6 billion was directly loaned to companies and other organizations in the energy sector. Also, the government committed to guarantee nearly $785 million in additional loans in the sector. In fiscal year 2009, those numbers significantly increased, with direct loans adding up to $16.7 billion and commitments to guarantee third party loans totaling $14.5 billion. Subsidy estimates produced by the government for these loans and loan guarantees are presented below where available. While subsidy rates are often presented for specific programs, actual subsidy dollar amounts were not provided by the federal agencies administering the energy loan and loan guarantees shown below. Therefore, Subsidyscope does not present an aggregate total for the subsidy provided. Further, due to omissions and other potential errors in federal data, these numbers should be used with caution.[1]

Subsidyscope refers to these methods of providing subsidies (e.g., loans) as "risk transfers." By transferring risk from others to itself, the federal government encourages people to undertake activities they may not otherwise carry out. Such risk transfers are typically accomplished through government credit and insurance programs, such as the student loan program and federal deposit insurance. The extent of a subsidy received under a credit or insurance program generally is the difference between the terms the recipient would get in a competitive market and those offered by the government. (See Subsidyscope's discussion here for more detail on federal credit and insurance programs.)

Under the Federal Credit Reform Act of 1990 the government is required to estimate the expected cost to the government of loan and loan guarantee programs. While these estimates have limitations,[2] the government essentially attempts to predict the net cost of a loan or loan guarantee by totaling up all the expected future cash flows to and from the government. A positive net flow from the government indicates there is a net cost to the government and that a subsidy is being provided to the borrower. The "subsidy rate" is the net cost (in current dollars) to the government divided by the total loan volume of the program; this rate approximates the percentage of the loan disbursements that the government is expected to lose after the expected return on the investment is taken into account.[3]

In the energy sector, there are several main programs through which the government takes on risk. The largest programs are carried out by the U.S. Department of Energy (DOE) through the innovative technology and renewable energy loan guarantee programs, which were significantly ramped up as part of the American Recovery and Reinvestment Act of 2009 (ARRA). Another large program is the U.S. Department of Agriculture's (USDA) Rural Utility Service, which makes loans and loan guarantees for generating and distributing electricity. In addition, the DOE provides lending and loan guarantees for nuclear power facilities. Prior to 2009, the majority of the direct loans in the energy

sector were administered through the USDA for the purpose of improving electricity transmission in rural areas. Loan guarantees were also primarily administered through the USDA, with programs focusing on both electricity transmission and renewable energy production. These and other programs are described in more detail below.

Table 1: Loans in the Energy Sector Fiscal Years 2008 and 2009

Program	Agency	2008 Subsidy Rate %	2008 Obligations ($ millions)	2009 Subsidy Rate %	2009 Obligations ($ millions)
Advanced Technology Vehicle Manufacturing	DOE			21.74	10,100
Rural Electrification and Telephone Program: FFB Electric Loans	USDA	-0.70	6,500	-2.28	6,500
Rural Electrification and Telephone Program: Electric Hardship Loans	USDA	0.12	99	-2.38	100
Energy Retrofit Loans	HUD			89.92	92
Total			**6,599**		**16,792**

Source: Subsidyscope analysis of data from the Federal Credit Supplement (FCS). 2008 numbers are from the FCS FY2009, Table 1.; 2009 numbers are from the FCS FY2010, Table 1.

Note:
Credit programs may report "negative" subsidies under the accounting and valuation rules specified in the Federal Credit Reform Act of 1990. A negative subsidy occurs when the estimated cost to the government of providing credit is less than the estimated income from repayments, interest and fees. The cost to the government is in part determined by the estimated risk of default. Most frequently, negative subsidies result from the use of a risk free discount rate to value risky future cash flows. This has the effect of overvaluing expected income to the government from loans and guarantees and undervaluing the government's expected costs from defaults. See this CBO report for additional information.

FFB=Federal Financing Bank

Loans

In fiscal year 2009, the energy sector loan program with the largest estimated loan obligations was the Advanced Technology Vehicle Manufacturing Loan Program (ATVMLP), authorized in the Energy Independence and Security Act of 2007. This program includes both grants and loans (only the loan obligations are presented here), and supports the development of advanced technology vehicles in the United States. Estimated obligations of over $10 billion in fiscal year 2009 are intended to promote technology that will increase fuel efficiency and reduce emissions.[4] For a vehicle to fit the definition of an advanced technology vehicle, "it must have at least 125 percent of the average base year combined fuel economy for vehicles with 'substantially similar attributes.'"[5] A list of conditional commitments made through the program can be found on the DOE's ATVMLP Web page. As of September 2010, the ATVMLP has made a total of $8.6 billion in conditional commitments to companies.

The second and third largest loan programs in the energy sector in fiscal year 2009 are through the USDA's Rural Electrification and Telephone Program (yet these are the smallest in terms of the subsidy rate). The Federal Financing Bank (FFB) Electric Loans Program made loan obligations of $6.5 billion in fiscal year 2009, and the Electric Hardship Loans Program made loan obligations of $100 million in fiscal year 2009. According to USDA, eligible loan recipients for both programs include "corporations, states, territories, and subdivisions and agencies thereof, municipalities, people's utility districts, and cooperative, nonprofit, limited-dividend or mutual associations that provide retail or power supply service needs in rural areas." [7]

Another relatively large energy-related loan program authorized in the ARRA provides grants and loans for sustainable or "green" retrofitting for multifamily housing units.[8] The Energy Retrofit Loans Program is implemented by the U.S. Department of Housing and Urban Development (HUD) which notes that this funding will be invested in energy efficient modernization and renovation of HUD-sponsored housing for low-income, elderly and disabled persons.[9] In fiscal year 2009, $92 million in loans were obligated through this program.

Table 2: Loan Guarantees in the Energy Sector Fiscal Years 2008 and 2009

Program	Agency	2008 Subsidy Rate %	2008 Commitments ($ millions)	2009 Subsidy Rate %	2009 Commitments ($ millions)
Title 17 Innovative Program: Section 1705 FFB Loans	DOE			11.81	8,000
Title 17 Innovative Program: Section 1703 FFB Loans	DOE			0.00	6,000
Renewable Energy Loan Guarantees	USDA	9.69	184	9.69	312
Section 9003 Loan Guarantees (Biorefinery Assistance)	USDA			33.34	225
Title 17 Innovative Technology Loan Guarantees	DOE		600		
Total			**784**		**14,537**

Source: Subsidyscope analysis of data from the Federal Credit Supplement (FCS). 2008 numbers are from the FCS FY2009, Tables 1 and 2.; 2009 numbers are from the FCS FY2010, Tables 1 and 2.

Note:
The two programs entitled 'Title 17 Innovative Program: Section 1705 FFB Loans' and 'Title 17 Innovative Program: Section 1703 FFB Loans' were categorized as direct loans in the FY2010 Federal Credit Supplement. However, materials from the DOE describe both as loan guarantee programs. Thus, Subsidyscope categorizes them as loan guarantees in its analysis of the energy sector.

Loan Guarantees

The two largest loan guarantee initiatives in the energy sector are the DOE's Section 1703 and 1705 loan guarantee programs, which together covered almost $14 billion in loan commitments in fiscal year 2009. The Energy Policy Act of 2005 created the Section 1703 program to support projects whose high technology risks make it difficult to obtain private financing.[10] Eligible projects include renewable energy systems, electric power transmission systems and biofuel projects with a technology pilot project component.[11]

The ARRA authorized a temporary provision under Section 1705 of the Energy Policy Act of 2005 (EPACT) in order to support projects similar to those in Section 1703. According to the DOE, Section 1703 loan guarantees require the borrower to pay for the subsidy costs, while the new authorization under 1705 holds that the subsidy costs are provided by the government.[12] The projected commitments for these programs presented in the President's Budget for fiscal year 2010 and fiscal year 2011 show continuing increases in loan guarantees.

The DOE also uses authority granted in EPACT to guarantee loans for nuclear facilities in an effort to expand the use of nuclear electric power in the United States. The Federal Credit Supplement does not identify which guarantees are for nuclear power plants; however, the President's Budget for fiscal year 2011 proposes an additional $36 billion in loan guarantee authority be made available for nuclear power facility projects.[13]

The Price-Anderson Nuclear Industries Indemnity Act

The Price-Anderson Nuclear Industries Indemnity Act (Price-Anderson Act) limits the financial liability of companies licensed to operate nuclear power plants. Specifically, nuclear power plant licensees are required to pay an insurance premium every year for $300 million of coverage per nuclear reactor unit. In the event a nuclear accident results in offsite damages of more than $300 million per reactor, each licensee is responsible for additional coverage of up to, but no more than, approximately $96 million per reactor unit. Licensees are not responsible for damages over this amount. The cap includes not only accidents that may happen during the operation of a reactor but also any mishap (including theft or sabotage) that may happen during the transport or storage of nuclear fuel or waste to or from the reactor. The purpose of the Price-Anderson Act is to establish a process for compensating the public for damages in the event of a nuclear accident and encourage private investment in nuclear power.

While the liability limit has never been exceeded,[14] in 2007 the Energy Information Administration concluded that the Price-Anderson Act "reduces the cost of insurance to the owners of nuclear power plants . . . and, hence, reduces the cost of nuclear power and other nuclear activities."[15] While estimates of this subsidy vary widely, in 2008 the Congressional Budget Office concluded that the subsidy is probably less than one percent of the cost for new nuclear generating capacity or about $600,000 per reactor.[16] As of the date of this estimate there were 104 commercial nuclear power reactors in the United States, resulting in an implied total subsidy of approximately $62 million.[17]

The Oil Spill Liability Trust Fund

The Oil Pollution Act (OPA) of 1990 established that the owner or operator of a facility responsible for an oil spill is also responsible for the associated damages, up to the limit of their liability.[18] The limit on damages is determined by the circumstances of the spill. For example, onshore facilities are liable for up to $350 million per spill, while holders of leases or permits for offshore facilities (such as the Deepwater Horizon drilling rig leased by BP) are liable for damages of up to $75 million per spill (not including removal costs).[19] If an oil spill is found to be the result of gross negligence, the responsible party is no longer entitled to a liability limit.[20]

The Oil Spill Liability Trust Fund (OSLTF) was created by the OPA to help the federal government rapidly and effectively manage the response to oil spills.[21] The primary purpose of the Fund is to provide the initial payment for the cleanup costs and damages resulting from oil spills, in the event that the party responsible for the spill is unknown or is unable to effectively respond to the spill.[22] Importantly, the OSLTF also pays for economic damages when the liability limit on a specific incident is reached (subject to the caps described below). In instances where the responsible party is known, the National Pollution Funds Center (under the Coast Guard) which administers the program, will later bill the costs of the cleanup and damages (up to the liability limit) to the responsible party.[23] The total amount of OSLTF funds available for a single incident is generally capped at $1 billion, with a cap of $500 million applying specifically to the payment of claims for damages to natural resources.[24]

The OSLTF is financed primarily through a tax on oil produced in or imported to the U.S., as well as through fines, penalties and cleanup costs recovered from liable parties.[25] To the extent that the OSLTF is financed by revenue from the energy sector, the cleanup costs, damages and other costs paid out of the OLTSF do not constitute a subsidy to the energy sector. It is not clear how an oil spill response would be funded in the event that the costs reach the OSLTF's $1 billion maximum for a single incident.[26]

1. *See our page on data quality for a description of some of the errors Subsidyscope has found in federal data.*
2. *Congressional Budget Office (CBO). "Estimating the Value of Subsidies for Federal Loans and Loan Guarantees." August 2004. pp. 1-2.*

3. *For more on the calculation of subsidy rates see: CBO. "Subsidy Estimates for Direct and Guaranteed Student Loans." November 2005, Box 2, p. 10.*
4. *Office of Management of Budget (OMB). "Federal Credit Supplement FY2010." Table 1. U.S. Government Printing Office.*
5. *U.S. Department of Energy (DOE). "Advanced Technology Vehicles Manufacturing Incentive Program Technical Support Document."*
6. *U.S. Department of Agriculture. "Loans Administered by the Electric Program Rural Utilities Service." November 18, 2004.*
7. *U.S Department of Housing and Urban Development (HUD). "Webinar: The Recovery Act's Green Retrofit Program for Multifamily Housing." June 10, 2009.*
8. *HUD. "HUD Implementation of the Recovery Act."*
9. *DOE. "Webinar: Loan Guarantee Program, Suggestions for a Strong Application." September 8, 2009.*
10. *"American Recovery and Reinvestment Act of 2009." P.L. 111-5, United States Statutes at Large. Sec 1705 (a)(1).*
11. *DOE. "Webinar: Loan Guarantee Program, Suggestions for a Strong Application." September 8, 2009.*
12. *OMB. "The Appendix, Budget of the United States Government, Fiscal Year 2011." U.S. Government Printing Office. 2010. p. 441.*
13. *The most serious accident at a U.S. nuclear power plant, the 1979 accident at Three Mile Island Nuclear Station, resulted in $70 million in liability claims. See: Government Accountability Office (GAO). "NRC's Liability Insurance Requirements for Nuclear Power Plants Owned by Limited Liability Companies." May 2004. p. 5.*
14. *Energy Information Administration (EIA). "Federal Financial Interventions and Subsidies in Energy Markets 2007." April 2008. p. 197.*
15. *CBO. "Nuclear Power's Role in Generating Electricity." May 2008, Box 3-1, pp. 28-29.*
16. *This is an extrapolation based on CBO's estimate of the cost of the subsidy under Price-Anderson for one nuclear plant, and is therefore a crude measure and only as good as that estimate.*
17. *U.S. Environmental Protection Agency (EPA). "Oil Pollution Act Overview." Last Updated: March 17, 2009; and U.S. Department of Homeland Security (DHS) and United States Coast Guard (USCG). "Oil Spill Liability Trust Fund (OSLTF) Funding for Oil Spills." January 2006. p. 3.*
18. *EPA. "Oil Pollution Act Overview." Last Updated: March 17, 2009.*
19. *DHS and USCG. "Oil Spill Liability Trust Fund (OSLTF) Funding for Oil Spills." January 2006. p. 4.*
20. *EPA. "Oil Pollution Act Overview." Last Updated: March 17, 2009.*
21. *EPA. "Oil Spill Liability Trust Fund." Last Updated: March 17, 2009; and DHS and USCG. "Oil Spill Liability Trust Fund (OSLTF) Funding for Oil Spills." January 2006. pp. 1, 3.*
22. *DHS and USCG. "Oil Spill Liability Trust Fund (OSLTF) Funding for Oil Spills. January 2006. p. 3; and U.S. House of Representatives Committee on Transportation and Infrastructure. "Hearing on Liability ad Financial Responsibility for Oil Spills under the Oil Pollution Act of 1990 and Related Statutes." June 8, 2010. p. 9.*
23. *DHS and USCG "Oil Spill Liability Trust Fund (OSLTF) Funding for Oil Spills. January 2006. p. 2.*
24. *USCG National Pollution Funds Center. "The Oil Spill Liability Trust Fund (OSLTF). Structure of the Fund." Last Updated: May 6, 2010.*
25. *"Oil Spill Liability Trust Fund." U.S. Code 26, Section 9509. 2007 ed.*

Last updated September 9, 2010.

Energy

Regulations in the Energy Sector

The federal government provides subsidies to the energy sector through regulations.[1] While the subsidies created by some individual regulations have been estimated, unfortunately there is currently no systematic or comprehensive identification and quantification of regulatory subsidies. However, it is evident from the examples presented below that regulatory requirements can dramatically influence specific energy markets by providing large benefits to particular producers or consumers. This section describes a few energy-related regulations and the subsidies they provide. The regulations presented here do not exhaust all the regulations that provide energy subsidies but are intended to illustrate how regulations may significantly impact energy markets.

Oil and Gas Royalty Relief

The U.S. Department of the Interior (Interior) is required by law to ensure that "the United States receive fair market value of the use of public lands and their resources unless otherwise provided for by statute."[2] Thus, companies producing oil and natural gas from wells on Interior land or in Interior-administered waters of the outer continental shelf are required to pay the federal government royalties based on a percentage of the value of the petroleum products they extract and sell. Federal royalties are typically in the range of 12.5 percent to 18.75 percent and, in total, result in revenues in the billions of dollars a year.[3] In 2007, for instance, the United States collected approximately $9 billion in royalties from oil and gas production wells.[4]

Notwithstanding the legal requirement that the United States be fairly compensated for the use of its resources, various laws authorize the Secretary of the Interior to reduce the amount of royalties companies would otherwise pay for extracting oil and gas from Interior-administered property.[5] The reduction in royalties, also known as royalty relief, is intended to promote domestic oil and gas production, thereby reducing oil and gas imports. The authority to provide royalty relief is executed through regulations promulgated by Interior.

Government estimates of royalty relief in some areas indicate it can be in the billions of dollars every year. For instance, in 2008 the Government Accountability Office (GAO) estimated the cost of royalty relief for deep water areas in the Gulf of Mexico from 1996 to 2000 to be between $21 billion and $53 billion.[6]

However, demonstrating the complexity of regulatory subsidies, it may be impossible to estimate just how much of these forgone revenues are a subsidy. The federal government auctions off the right to develop oil and gas fields. When companies bid on the right to explore and develop a field, they do so with the expectation that they may receive royalty relief in the future. The higher the expected royalty relief, the higher the bid the company is willing to offer. Thus, as CBO points out, “[o]ver the long run, net receipts to the government might not change much.”[7] Royalty relief may only create a positive subsidy if the actual royalty relief eventually provided to the company exceeds the company’s expectations at the time they made their bid.

The Renewable Fuel Standard

The Renewable Fuel Standard (RFS) program provides a subsidy within the energy sector. The RFS mandates that a minimum volume of transportation fuel sold in the United States come from renewable sources.[8] This legal requirement is implemented through regulations issued by the U.S. Environmental Protection Agency (EPA).[9] Specifically, the law establishes three categories of renewable fuels (cellulosic biofuel, biomass-based diesel and advanced biofuel) with minimum annual volume requirements for each category ramping up to an overall requirement that at least 36 billion gallons of renewable fuel be blended into gasoline and diesel fuel by 2022.[10] In addition, each category of fuel must meet certain greenhouse gas emission standards.[11] The stated goals of the program include reducing reliance on oil and encouraging the development of domestic renewable fuels that may decrease greenhouse gas emissions.

To the extent the RFS mandate results in greater demand for renewable fuels (predominantly ethanol) and biofuel feedstocks (predominantly corn, soybeans and switchgrass), the RFS regulations provide a subsidy to renewable fuel producers and farmers who grow the feedstocks. Quantifying the value of these subsidies is difficult to do with accuracy given the uncertainty of fuel prices, production technology and crop yields over the next decade. Nonetheless, a 2010 EPA analysis estimates that the RFS program will boost farm income alone by approximately $13 billion through 2022 (in 2007 dollars).[12]

Environmental Response and Cleanup

Energy development and production activities, particularly the extraction of coal, uranium and oil, can result in environmental harm that, in some cases, is cleaned up by the federal government without compensation from the company that caused the harm. A number of programs, implemented through regulation and funded by the federal government, fit into this category. Such programs include, but are not limited to, the Office of Environmental Management (U.S. Department of Energy),[13] Superfund[14] and abandoned mine reclamation.[15]

In some cases the cost of cleanup is at least partially borne by the energy sector even if the responsible party does not bear the full cost of cleanup. For instance, federal grants to states for reclaiming abandoned coal mines are funded through fees paid by existing coal companies. Likewise, a tax on oil has been used in the past to help fund Superfund cleanups. Nonetheless, to the extent that fees, taxes and other revenues collected by the federal government from the energy sector do not cover the cost of federal response and cleanup from energy activities, the difference represents a subsidy to the energy sector.

1. *See section B.1. of Subsidyscope's methodology for a brief description of regulatory subsidies. Some argue that a government subsidy occurs when the government fails to correct problems through regulations resulting in certain goods or services being under-priced. For instance, they argue that a government's failure to adequately regulate greenhouse gas emissions results in coal being under-priced; resulting in a subsidy for coal companies. Subsidyscope does not take this approach. In practice, it would be very difficult to identify and measure under-regulated market failures. Deciding the appropriate level of regulation is a central function of government. Subsidyscope makes no judgment regarding whether a particular activity or market is over- or under-regulated.*
2. *"Federal Land Policy and Management Act." U.S. Code 43, Section 1701(a)(9). 2007 ed., pg. 472. See also "Outer Continental Shelf Lands Act." U.S. Code 43, Section 1344(a)(4). 2007 ed., pg. 307.*
3. *Government Accountability Office (GAO). "Mineral Revenues: MMS Could Do More to Improve the Accuracy of Key Data Used to Collect and Verify Oil and Gas Royalties." July 2009. p. 3, Footnote 1.*
4. *GAO. "Oil and Gas Royalties: The Federal System for Collecting Oil and Gas Revenues Needs Comprehensive Reassessment." September 2008, p. 1. There is some evidence that existing royalties and other compensation may be insufficient to fully compensate the United States. In 2007 the GAO reported that the U.S. federal government "take" from deepwater wells in the Gulf of Mexico was lower than 29 of 31 other similar international and state fiscal systems analyzed. See: GAO. "Oil and Gas Royalties: A Comparison of the Share of Revenue Received from Oil and Gas Production by the Federal Government and Other*

Resource Owners." Report No. GAO-07-676R. May 1, 2007, p.3.

5. *Such authority is provided by the Outer Continental Shelf Lands Act, as amended, the Deepwater Royalty Relief Act of 1995, and the Energy Policy Act of 2005. The corresponding regulations can be found at: Relief or Reduction in Royalty Rates. Code of Federal Regulations. Title 30, Section 203 (2009).*
6. *GAO. "Oil and Gas Royalties: The Federal System for Collecting Oil and Gas Revenues Needs Comprehensive Reassessment." September 2008. p. 6.*
7. *Congressional Budget Office. "Letter to Senator Ron Wyden from Donald B. Marron." March 15, 2006. p. 3.*
8. *"Renewable Fuel Program." U.S. Code 42, Section 7545(o). 2007 ed., pg. 1864-1867, as amended by Section 1501 of the Energy Policy Act of 2005 and Subtitle A of Title II of the Energy Independence and Security Act of 2007.*
9. *U.S. Environmental Protection Agency (EPA). "Fuels and Fuel Additives: Renewable Fuel Standard (RFS)." Last Updated: July 07, 2010.*
10. *The volumetric requirements were increased to these levels by paragraph 202(a)(2) of the Energy Independence and Security Act of 2007.*
11. *Section 202(c) of the Energy Independence and Security Act of 2007 amended the greenhouse gas requirements such that the Administrator of the Environmental Protection Agency may change the requirements under certain circumstances.*
12. *EPA. "Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis." EPA-420-R-10-006. February 2010. Table 5.5-1, p. 967.*
13. *U.S. Department of Energy. "Office of Environmental Management (EM)." Last Updated: July 9, 2010.*
14. *EPA. "Superfund: Cleaning up the Nation's Hazardous Wastes Sites." Last Updated: May 18, 2010.*
15. *Office of Surface Mining Reclamation and Enforcement. "Reclaiming Abandoned Mine Lands: Title IV of the Surface Mining Control and Reclamation Act." Last Updated: February 26, 2010. U.S. Department of the Interior.*

Last updated September 9, 2010.
