5. Subsidies Per Unit of Production

The previous chapters of this report described energy-related subsidies that the Federal government provides through tax expenditures, direct expenditures, research and development (R&D), and financial assistance in the form of grants, direct loans and loan guarantees for energy producing industries, intermediate product market participants, and end-users. In considering electricity production, the electric power industry generally involves all of these segments. It includes producers in terms of the production of electric power. It includes intermediate product market participants with respect to the factor inputs to electricity production, e.g., capital, labor and fuel. Finally, it includes retail customers, who are beneficiaries of a variety of tax expenditures and direct subsidies that are intended to foster conservation and energy efficiency and reduce the cost of electricity to qualified low income consumers.

The previous chapters of this report also quantified energy-related tax expenditures, R&D, and other subsidies, many of which have a direct or indirect impact on electricity production. However, some of those tax expenditures, R&D outlays, and other subsidies have no connection to electricity production. Others, such as exploration and production tax credits for fuel producers, have an indirect impact on electricity production in that they provide financial incentives to fuel producers to invest in new technologies and explore for fuel resources, which at current market prices may only be marginally economic. If these incentives are successful in terms of bringing significant supplies to market in the long run, it helps to ensure energy security and potentially lowers equilibrium prices as supply increases. This may affect utility and nonutility generators' selection of particular forms of generation. For purposes of this analysis, while fuel producers are the direct beneficiary of production tax credits, electricity producers indirectly benefit from supply increases and diversity of fuels. Therefore, a portion of direct subsidies to these entities is allocated as a subsidy to electricity production in proportion to the amount of the fuel consumed in electricity production to which a particular subsidy applies. The subsidies are presented in total dollars and per megawatthour (MWh) of generation by fuel type based on EIA generation data for the 12-month period ending September 30, 2007 (FY2007 MWh).[200]

This chapter describes the methodology used to estimate electricity production subsidies by fuel type. The methodology consists of defining the electricity production to which the subsidies apply, identifying the subsidies for which there is a direct or indirect benefit to electricity production by fuel type, and allocating the estimated dollar value of each subsidy to each fuel type. The dollar per unit--MWh--of subsidies by fuel type is calculated as the aggregate subsidy in dollars for each fuel divided by the corresponding FY2007 generation (MWh). Subsidies provided to the electric utility industry that are unrelated to generation, such as transmission-related tax expenditures are expressed in dollars per MWh based on total electricity production. This is based on the assumption that the incentives these benefits provide to transmission owners to expand or upgrade their systems benefit all forms of generation in proportion to their use of the transmission system. Therefore, the dollar per MWh value for total nonfuel-related electricity subsidies is based on total electricity production.

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[200] Energy Information Administration, Form EIA-906, "Power Plant Report" and Form EIA-920, "Combined Heat and Power Plant Report," October 2006 through September 2007.

Definition of Electricity Production

For purposes of this analysis, electricity production encompasses the principal classes of electric plant required to produce and deliver electricity to the end-user. This includes all assets associated with the three functional areas of electricity supply: generating plants, transmission lines and distribution facilities. Electricity production is defined as: electricity produced via generating plants owned by traditional utilities (investor-and publicly-owned-utilities, generation/transmission cooperatives, and Federally-owned utilities) and nonutility generators. Fuel is an operating cost that is associated with electricity production.

Non-utility generators include independent power producers (IPPs), affiliated power producers, Qualifying Facilities (QFs) and combined heat and power (CHP) plants whose primary purpose is to sell electricity or electricity and heat to the public. Nonutility generators are included because these entities are direct or indirect beneficiaries of numerous subsidies identified in this report.

Electricity Production Subsidies

A number of energy-related R&D direct expenditures and tax expenditures programs described in the previous chapters are not included in the subsidies assigned to electricity production. These include direct expenditures, tax expenditures, and R&D associated with development of alternative transportation fuels and end-user related activities such as energy efficiency and conservation. Of the $16.6 billion in energy-related subsidies identified by EIA, $6.7 billion are classified as direct or indirect subsidies and directed to electricity production (Table 26).

Indirect subsidies consist of fuel-specific R&D for use in electric generation. Indirect subsidies also include tax incentives and direct expenditures provided to entities engaged in the production of fuel used to produce electricity. These benefits are allocated to electricity production based on fuel allocation factors discussed below. Direct subsidies to electricity producers that provide incentives to investment in generation technology of a specific fuel type are assigned to electricity production in their entirety and are included in the $5.1 billion of subsidies allocated to electricity production by fuel type.

The methodology used to allocate the interest rate support by fuel type is described below. The interest rate support for the Federal utilities and Rural Utilities Service (RUS) borrowers is estimated to be $767 million. Of this amount, $407 million is allocated to power sector generation by fuel type. The remaining $360 million, which is the interest subsidy associated with Federally-subsidized transmission and distribution facilities, is included in non-production related electricity subsidies. The interest rate support for the Tennessee Valley Authority (TVA), the Federal Power Marketing Administrations (PMAs) and RUS borrowers is the estimated subsidy calculated at the benchmark interest rate for A-rated IOU bonds described in Chapter 4. Subsidies provided to the electric power industry that are not directly allocated to electricity production by fuel type are estimated at $1.2 billion. The majority of these subsidies are transmission-related tax incentives that modify provisions of the Internal Revenue Code (Code or IRC) to promote investment in transmission infrastructure and increase transmission owners' participation in open access transmission. In some instances, as was described in Chapter 2, certain provisions of the Code acted as impediments for transmission owners to engage in activities and transactions that would expand the amount of transmission capacity operating under non-discriminatory open-access tariff or under the control of regional transmission organizations and independent system operators (RTOs/ISOs).

Table 26. Allocation of Electricity Production and Other Energy Subsidies (million 2007 dollars)

Subsidy and Support Category	FY 2007 Electricity Production Subsidies and Support	FY 2007 Other Energy Subsidies and Support	FY 2007 Total Energy Subsidies and Support
Fuel Specific[1]	5,105	2,330	7,435
Transmission and Distribution[2]	1,235	-	1,235
Federal Utilities and RUS Borrowers Capacity[3]	407	-	407
Energy Subsidies Unrelated to Electricity Production[4]	-	7,504	7,504
Total	6,747	9,834	16,581

NOTES: Totals may not equal sum of components due to independent rounding.

[1]Includes fuel-related tax expenditures, R&D, and direct expenditures applicable entirely to a specific type of electric generation, or primary fuel production-related subsidies allocated to either electricity or other sectors based on each sector's proportionate consumption of the applicable fuel. Excludes fuels that have no role in electricity production, such as ethanol and other biofuels.

[2] Includes transmission and distribution-related tax expenditures, R&D, and the financial support attributable to Federal utilities' and RUS borrowers' debt associated with transmission and distribution assets with an estimated value of $360 million (See Table 34).

[3]Reflects the estimated portion of Federal utilities' and RUS borrowers' interest support attributable to long-term debt associated with capacity plant and certain TVA and BPA regulatory assets. This support is then assigned by fuel-type.

[4]Includes tax and direct expenditures for end-use activities and transportation-related alternative fuels. Among these subsidies are conservation programs, residential and commercial energy efficiency programs, and ethanol and biofuels tax credits.

Sources: Office of Management and Budget, *Budget of the United States Government, Fiscal Year 2008-Appendix*. Office of Management and Budget, *Analytical Perspectives Budget of the United States Government, Fiscal Year 2008, Federal Receipts and Collections*, http://www.whitehouse.gov/omb/budget/fy2008/. Joint Committee on Taxation, "Estimated Budget Effects Of The Conference Agreement For Title XIII of H.R. 6, The Energy Tax Incentives Act Of 2005," JCX59-05, July 27, 2005. (Washington, DC, November 2007).
Energy Information Administration, Form EIA-860, "Annual Electric Generator Report," 2006; Energy Information Administration, Form EIA-906, "Power Plant Report;" and Form EIA-920, "Combined Heat and Power Plant Report," October 2006 through September 2007.

To the extent these incentives provide benefits to all users of transmission facilities placed under the operational control of RTOs/ISO, all forms of generation benefit. Accordingly, these tax expenditures are included in non-production-related electricity subsidies. Subsidies unrelated to electricity production, totaling $7.5 billion, are not included in the estimate of direct and indirect subsidies for electricity production, as are $2.3 billion in fuel-related subsidies that are allocated to consumers, i.e., residential, commercial, industrial and transportation, based their direct receipt and consumption of the applicable fuel.

Allocation of Subsidies
This portion of the chapter describes the method used to allocate the four categories of subsidies described above. The following four sections provide a description of the methodology and the specific subsidies that comprise the $16.6 billion of total energy-related subsidies and support, and the $6.7 billion assigned to electricity production.

Subsidies Unrelated to Electricity Production

Energy-related subsidies totaling $9.8 billion have not been allocated to electricity production. These subsidies are divided into two categories. The first category consists of subsidies totaling $7.5 billion (Table 27). The second category consists of the portion of fuel-specific subsidies that are allocated to end-use sectors, i.e., residential, commercial, industrial and transportation, other than the electric power sector based on their relative consumption of the fuels to which the subsidies applied. These fuel-specific subsidies totaled $2.3 billion FY 2007.

The $7.5 billion in subsidies unrelated to electricity production are either related to the promotion of alternative transportation fuels, i.e., bioenergy/biofuels or funding for programs that focus on energy efficiency and conservation by residential, commercial, and industrial end users of electricity and other conventional energy sources. Conservation, energy efficiency, and other end-use subsidies reduce consumption thereby slowing the demand for capacity additions. While these subsidies may be related to electricity (and other forms of energy consumption, such as natural gas), they do not provide a direct or indirect subsidy to electricity production. Therefore, they are not included for purposes of allocating electricity-related subsidies. A second category of subsidies considered end use for purposes of this analysis are grants, loans, and loan guarantees made by the Rural Business-Cooperative Service (RBS) under various programs including the Renewable Energy and Energy Efficiency Program that was created under Section 9006 of the Farm Security and Rural Investment Act of 2002 (Public Law 107-171). These subsidies include grants and loan guarantees for feasibility studies for renewable electric power facilities, e.g., wind, solar, and biomass, or financial assistance for the construction of such facilities. The recipients are farmers, ranchers, and small business that are planning or actually constructing electric production facilities for use at their commercial establishments, farms, or ranches. The electricity produced from facilities that may be constructed under these programs is for off-grid use. It is primarily for purposes of improving the efficiency of and reducing energy costs for an individual commercial enterprise. Thus, they do not fall within the definition of electric production used in this report.

Energy assistance programs for low-income consumers are also excluded from electricity production subsidies. These include LIHEAP and the RUS Assistance to High Energy Cost Rural Community grant program. The LIHEAP program, at $2.2 billion, was the second-largest energy subsidy not allocated to electricity production.[201] Arguably, LIHEAP provides an indirect subsidy to retail electricity suppliers by providing financial assistance to low-income consumers to defray heating and cooling costs through block grants provided to the States. Thus, the indirect benefit to retail electricity suppliers is the reduction of accounts receivable or delinquent accounts.

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[201] The tax credit for alcohol fuels, at $3.0 billion, was the largest energy-related subsidy not allocated to electricity production.

Table 27. Subsidies not Allocated to Electricity Production (million 2007 dollars)

Program	2007 Subsidy	Recipient or End-Use Category
Hydrogen R&D	230	Basic Research
Credit for Construction of New Energy-Efficient Homes	20	Residential
DOE Conservation (Weatherization and State Energy)	256	Residential
RUS High Energy Cost Community Grants	-17[1]	Econ. Dev.
RBS Small Minority Producer Grants	0.3	Small Businesses
RBS Value Added Grants	3	Small Businesses
30-Percent Credit for Residential Purchases/Installations of Solar and Fuel Cells	10	Residential
RBS Section 9006 Grants	13	Small Business
Temporary 50-Percent Expensing for Equipment Used in the Refining of Liquid Fuels	30	Refiners
RBS Loan Guarantees	42	Small Business
RBS Business and Industry Loan Guarantee	60	Small Business
DOE Industrial R&D	66	Applied Research
Credit for Energy Efficient Appliances	80	Manufactures
Building Technology, State and Community Programs	103	Commercial
Exclusion for Utility-Sponsored Conservation Measures	110	Residential
Allowance of Deduction for Certain Energy-Efficient Commercial Building Property	190	Commercial
Credit for Energy-Efficiency Improvements of Existing Homes	380	Residential
Low Income Home Energy Assistance Program	2,188	Residential
Expensing of Capital Costs with Respect to Complying with EPA Sulfur Regulations	10	Refiners
USDA Research, Education, and Extension Service (REES)-Bioenergy/Biofuels	29	Applied Research
Alcohol Fuel Credit	50	Alt. Fuels Industry
Biodiesel and Small Agri-Biodiesel Product Tax Credits	180	Alt. Fuels Industry
DOE Transportation R&D	221	Applied Research
Credit, Deduction for Clean Fuel Vehicles	260	Individuals/Fleets
Excise Taxes/VEETC (Alcohol Fuels Exemption)	2,990	Alt. Fuels Industry
Subtotal	7,540	
Fuel Specific Subsidies	2,330	End-use sectors other than Electric Power
Total	9,834	

NOTES: Total may not equal sum of components due to independent rounding.

[1]Reflects a rescission of allocated grant funds from the prior fiscal year.

Sources: Office of Management and Budget, *Budget of the United States Government, Fiscal Year 2008-Appendix*. Office of Management and Budget, *Analytical Perspectives Budget of the United States Government, Fiscal Year 2008, Federal Receipts and Collections*, http://www.whitehouse.gov/omb/budget/fy2008/. Joint Committee on Taxation, "Estimated Budget Effects Of The Conference Agreement For Title XIII of H.R. 6, The Energy Tax Incentives Act Of 2005," JCX59-05, July 27, 2005. Energy Information Administration, Electric Power Annual 2006, DOE/EIA-0348 (2006) (Washington, DC, November 2007). http://www.eia.doe.gov/fuelelectric.html. EIA analysis.

Energy assistance programs do not subsidize investment in generating capacity because many utilities would still be required to provide service under State regulations that preclude the termination of service during periods of extreme temperatures.[202] The RUS High Energy Cost Rural Community grant program provides assistance for rural utility infrastructure. However, the means tests for determining eligibility are such that communities and small utilities in Alaska are

[202] A State-by-State summary of seasonal termination protection policies is available on the LIHEAP Clearinghouse web site at http://liheap.ncat.org/Disconnect/SeasonalDisconnect.htm.

the principal beneficiaries. Many of these systems are electrically isolated within the State of Alaska.

The $2.3 billion in fuel-specific subsidies not allocated to electric production include an allocable portion of a variety of tax expenditures and direct expenditures including; expensing of exploration and development costs, excess of percentage over cost depletion, fuel-specific R&D, and changes in natural gas pipeline property life for tax depreciation purposes. All of the fuel-specific subsidies that were allocated on the basis of end-use consumption ratios are listed in Table 30. The derivation of the fuel allocation ratios and the division of fuel-specific subsidies to the electric power sector are described in the following section.

Subsidies Allocated by Fuel Type

There are a variety of tax expenditures and R&D expenditures that provide benefits to fuel producers, researchers, and industry. Tax expenditures are in the form of production or investment tax credits, tax deferrals, preferred tax rates, and expense deductions, e.g., expensing all or a portion of costs that are normally capitalized. Electricity producers are not necessarily the direct beneficiary of these expenditures. Fuel producers, as taxpayers, are the direct recipient of the benefit of production tax credits, investment tax credits, and preferential expensing of development and capital costs allowed for the production of particular fuels. The attribution and allocation of these subsidies to electric generation by fuel type is premised on the fact that government expenditures that promote such economic activities ultimately provide benefits to electricity producers that consume that particular fuel. For example, the expensing of natural gas and oil exploration and development costs reduces producers' current period taxable income, which provides an incentive to invest in capital equipment to explore and develop natural gas and oil resources situated in deep water or in remote and geologically complex onshore locations. By subsidizing the initial foray of exploration and development that harbor potential plentiful domestic supplies that are not commercially viable at current market prices, the industry is able to develop new technologies and methods that may hasten the commercial viability of bringing geologically remote energy supplies to market. In the long-run, the expectation is that these subsidies increase energy supplies. Thus, existing electricity generators will benefit from increased supply and lower prices.

A similar argument applies with respect to allocating R&D expenditures for advanced clean fuels and power production technology to current electric production. From an intertemporal perspective, current generating capacity may employ more efficient production and environmental technologies as a result of past R&D expenditures. While the electric power industry invests in R&D to increase the efficiency of the production and delivery of electricity, e.g., the research activities of the Electric Power Research Institute, government R&D expenditures are typically targeted at the investigation of new technologies for which either the risk or the long lead time incurred prior to realization of a return on investment make such expenditures financially prohibitive to the private sector. Based on this theory, current electricity producers are deemed to be indirect beneficiaries of R&D expenditures. Therefore, fuel-related R&D expenditures are allocated to generation by fuel type based on the proportion of each fuel consumed in electricity production relative to total consumption across all market segments.

Other subsidies are more clearly attributable to electricity production by fuel type, such as the production tax credit for electricity generated by newly-constructed nuclear plants and clean coal tax initiatives. Clean Renewable Energy Bonds and New Technology Tax Credits subsidize a variety of renewable fuels, e.g., biofuels, synthetic coal, wind, and biomass. Given the

inherent uncertainty regarding technology and fuel choice of electricity producers that choose to take advantage of these subsidies, they are allocated based on the proportion of each fuel that was consumed in electricity production in 2006. In the absence of detailed information on individual renewable subsidies, a weighted average fuel ratio reflecting the amount of all renewable fuels consumed by electricity producers is used. With respect to the Section 29 and Section 45 production tax credits, the methodology used to allocate the value of these tax expenditures estimated by the Treasury Department is described in Chapter 2.

Derivation of Fuel Ratios

The ratios used to allocate subsidies by generation fuel type represent the portion of each primary fuel consumed for electricity production relative to the remaining sectors of the economy, such as industry and transportation (Table 28).

Table 28. Fuel Allocation Factors (percent)

Fuel	Fuel Consumed in Electricity Production as a Percentage of Total Fuel Consumption
Coal	91.0
Natural Gas and Petroleum Liquids	11.3
Nuclear	100.0
Renewables	56.4
Wind	100.0
Solar	7.0
Biomass and biofuels	12.9
Geothermal	89.5
Hydroelectric	98.9

NOTE: The ratio of power sector consumption for Natural Gas and Petroleum Liquids represents a weighted average across both fuel types.

Source*:* Energy Information Administration, *Annual Energy Review 2006*, DOE/EIA-0384 (2006) (Washington, DC, June 2007), Tables 1.3 and 2.1f.

Natural gas and petroleum liquids are represented by a single ratio. This ratio reflects the weighted average of natural gas and petroleum used in electricity production relative to total natural gas and petroleum consumption. The Treasury Department's published estimate of oil and natural gas production-related tax expenditures does not allocate the value of the tax expenditure between oil and natural gas. Because natural gas predominates compared to oil in electricity production, EIA used a weighted average of the respective amounts of each fuel consumed by electricity producers. Additionally, in 2006, 32.4 percent of natural gas-fired generation for which natural gas is the primary fuel reported petroleum as a secondary fuel.[203]

A composite fuel ratio and individual fuel ratios are developed for purposes of allocating subsidies to renewable electric generation. This is because some subsidies specifically target a particular technology while in other instances insufficient data were available to allocate a subsidy between the categories of renewables. For example, the allocation among renewable

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[203] Energy Information Administration, *Annual Energy Review 2006*, DOE/EIA-0384(2006) (Washington, DC, June 2007), Table 2.8.

technologies for governmental entities and electric cooperatives that received volume cap allocations to issue Clean Renewable Energy Bonds (CREB) tax credit bonds pursuant to IRC Section 54(f) cannot be estimated with any reasonable precision because Internal Revenue Service (IRS) disclosure limitations preclude the release of taxpayer-specific information. In the case of CREBS, IRC section 54(d)(2) defines the term "qualified project" as any of the following qualified facilities: wind, closed-loop biomass, open-loop biomass, geothermal, solar energy, small irrigation power, landfill gas, trash combustion, refined coal production facility under IRC section 45(d)(8) and a qualified hydropower facility.[204]

Furthermore, based on the data available for the results of the IRS' most recent allocation of CREBs credits by fuel–type or technology, which uses a "smallest to largest method," i.e., projects for which the smallest amount of the dollar cap has been requested, up to the maximum volume cap, there are not sufficient data to allocate CREBs credits by individual renewable technology.[205] On December 27, 2005, the IRS issued a notice requesting applications for allocations of CREBS. On November 20, 2006, the IRS released the results of the volume cap allocation process. There were a total of 610 projects approved by renewable fuel type, which are summarized by fuel type in Table 29. While 71 percent of the approved projects were solar and 18 percent were wind, in the absence of detailed tax return information

Table 29. Fiscal Year 2006 CREB Authorized Allocation by Fuel Type

Renewable Fuel Type	Number of Projects
Hydroelectric	14
Landfill Gas	36
Open Loop Biomass	13
Refined Coal	1
Solar	434
Wind	112
Total	610

Source: Internal Revenue Service, Informational Release IR-2006, November 20, 2006.

for those projects that issued CREBs, it is not possible to determine which renewable technology received the largest benefit in total dollars.

Subsidies Allocated by Fuel Type
The total value of energy subsidies that is allocated to specific fuel types $7.4 billion (Table 30). EIA estimates that, of this $7.4 billion, $5.1 billion is allocable to electricity production based on the share of each fuel consumed by the electric power sector relative to the total consumption of each fuel. The remainder of those subsidies for which less than 100 percent is allocated to electricity is assumed to be utilized by other sectors of the economy that also consume the particular fuel.

EPACT2005 provides for a nuclear production tax credit of 1.8 cents per kilowatthour applicable to electricity produced by the first 6 gigawatts of new nuclear capacity constructed and placed in service by 2020. As there are no nuclear plants eligible for the credit in the year 2007, there is

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[204] A qualifying hydroelectric project must certify that an incremental increase in capacity of an existing facility meets FERC efficiency requirements. Applicants must also certify that the proposed facility meets FERC licensing regulations. See IRC Sections 45(c)(8) and 45(d)(9).
[205] On December 27, 2005, the IRS issued a notice requesting applications for allocations of CREBS. On November 20, 2006, the IRS released the results of the volume cap allocation process. The Secretary of the Treasury authorized 610 State and local governmental entities, and electric cooperatives to issue CREBs.

no estimate of subsidy associated with nuclear production tax credit in this analysis. The Federal Credit Support Supplement to the FY 2008 budget shows no loan commitments for the EPACT Title XVII loan guarantee for program FY 2007.[206] The anticipated commercial operation date for new nuclear plants that would qualify for the credit is outside this forecast period.[207]

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[206] Office of Management and Budget, *Federal Credit Supplement Fiscal Year 2008*, Table 2: Loan Guarantees: Subsidy Rates, Commitments and Average Loan Size," p.2.

[207] EIA's *AEO2007* reference case forecast assumes 9.0 gigawatts of nuclear capacity will be built by 2020 and will receive tax credits worth 1.2 cents per kWh, which is consistent with the allocation method prescribed by the IRS in the event the nameplate capacity of eligible nuclear capacity exceeds the 6-gigawatt limit. See Energy Information Administration, *Annual Energy Outlook 2007*, DOE/EIA-0383 (Washington DC, February 2007), p. 84. The IRS provided guidance concerning the allocation of the nuclear production tax credit in Internal Revenue Bulletin 2006-18, Notice 2006-40, "Credit for Production from Advanced Nuclear Facilities," Section 3, May 1, 2006.

Table 30. Fuel-Specific Energy Subsidies (million 2007 dollars)

Subsidy Program	2007 Subsidy	Electricity Production Share	Fuel
Refined Coal Alternative Fuel Production Credit	2,370	2,156	Refined Coal
Fuel and Power Systems (Advanced Research and Technology Development)	311	283	Coal
Capital Gains Treatment of Royalties in Coal	170	155	Coal
Clean Coal Power Initiative (R&D)	61	55	Coal
Future Gen Advanced Clean Fuels (R&D)	54	49	Coal
Exclusion of Special Benefits for Disabled Coal Miners	50	46	Coal
84-Month Amortization of Certain Pollution Control Facilities	30	27	Coal
Credit for Investment in Clean Coal Facilities	30	27	Coal
Partial Expensing for Advanced Mine Safety Equipment	10	9	Coal
Unallocated (Coal R&D Programs)	148	135	Coal
Expensing of Exploration and Development Costs	860	98	Nat. Gas and Oil
Excess of Percentage over Cost Depletion	790	90	Nat. Gas and Oil
Amortize All Geological and Geophysical Expenditures over 2 Years	60	7	Nat. Gas and Oil
Natural Gas Distribution Pipelines Treated as 15-Year Property	50	6	Nat. Gas and Oil
Exception from Passive Loss Limitation for Working Interests in Oil and Natural Gas Properties	30	3	Nat. Gas and Oil
U.S. Geological Survey Energy Research and Development	20	2	Nat. Gas and Oil
Natural Gas (R&D)	15	2	Nat. Gas and Oil
Oil (R&D)	4	*	Nat. Gas and Oil
New Nuclear Plants (R&D)	319	319	Nuclear
Waste/Fuel/Safety (R&D)	350	350	Nuclear
Nuclear Decommissioning (R&D)	199	199	Nuclear
Unallocated (Nuclear R&D)	253	253	Nuclear
New Technology Credit (Investment Energy Tax Credit, Production Tax Credit)	690	690	Wind
Biomass (and Biofuels) (R&D)	246	32	Biomass (and Biofuels)
Solar (R&D)	187	13	Solar
Credit for Holding Clean Renewable Energy Bonds	60	34	Renewables
Wind (R&D)	58	58	Wind
Geothermal (R&D)	6	5	Geothermal
Renewable Energy Production Incentive	5	3	Renewables
Total	7,435	5,105	

NOTES: Totals may not equal sum of components due to independent rounding.

* Value less than $0.5 million.

Sources: Office of Management and Budget, *Budget of the United States Government, Fiscal Year 2008-Appendix*, Office of Management and Budget, *Analytical Perspectives Budget of the United States Government, Fiscal Year 2008, Federal Receipts and Collections.* See, http://www.whitehouse.gov/omb/budget/fy2008/. Joint Committee on Taxation, "Estimated Budget Effects Of The Conference Agreement For Title XIII of H.R. 6, The Energy Tax Incentives Act Of 2005," JCX59-05, July 27, 2005. Energy Information Administration, Electric Power Annual 2006, DOE/EIA-0348 (2006) (Washington, DC, November 2007). Energy Information Administration, Form EIA-906, "Power Plant Report;" Form EIA-920 "Combined Heat and Power Plant Report;" October 2006-September 2007.

Interest Rate Support to Federal Utilities and RUS Borrowers

The implied Federal support to TVA, the PMAs, and RUS borrowers is measured in terms of the differential between the embedded cost of debt of each entity, i.e., the quotient of current interest expense and current long-term debt, and a series of current interest rates for debt of comparable maturity. These rates include the Treasury's cost of money and investment grade rated IOU bonds ranging from Aaa to Baa. Theoretically, this method is akin to TVA, the PMAs, and all RUS borrowers refinancing their outstanding obligations at current interest rates, excluding transaction costs, while assuming all other risk factors, i.e., operational, financial, regulatory, environmental, competition, etc., that investors would consider in pricing the new debt issue are consistent with a given investment grade rating. For purposes of this report, the A bond rate is used for a point estimate.

Chapter 4 provides a detailed discussion of how a range of cost-of-capital support values was derived for each entity. The methodology considered their unique attributes and made adjustments to account for long-term obligations that for purposes of calculating the support should be treated as long-term debt. These obligations, such as TVA's lease/lease back and the unamortized prepayment received from customers that reduced their future power supply costs through prepayments, are obligations that the nationally-recognized rating agencies would consider in determining the adequacy of cash flow to cover fixed obligations (i.e., a modified debt service coverage ratio).

With respect to the Federal utilities, the support was allocated by fuel type on the basis of the reported net book cost for each type of generating capacity, as reported in their respective financial reports. The RUS interest support estimate, which reflects the support applicable to RUS generation-related insured loans and loan guarantees made to both distribution and power supply borrowers, was allocated on the basis of net summer capability. Based on an A-rated benchmark interest rate, support associated with the Federal utilities' generating capacity (and therefore allocated by fuel type) is estimated at $366 million (Table 31). Of the five, BPA realizes the highest interest rate support based on current interest rates at $146 million, followed by TVA at $119 million. WAPA ranks third at $41 million. Unlike the PMAs, TVA owns and operates a diversified portfolio of generation, which is dominated by its investment in nuclear and coal-fired capacity.

Table 31. Allocation of Federal Utilities' Interest Support by Fuel Type (million 2007 dollars)

Federal Utility	Interest Support by Fuel Type
TVA Hydroelectric	8
TVA Nuclear	63
TVA Fossil	43
TVA Combustion Turbine	5
TVA Total	119
BPA Hydroelectric	65
BPA Nuclear	81
BPA Total	145
WAPA Hydroelectric	41
SWPA Hydroelectric	36
SEPA Hydroelectric	24
Federal Utilities Support Allocated to Generation	364

NOTES: Total may not equal sum of components due to independent rounding.

TVA and PMA support is calculated from their annual audited financial statements, which conform to the Federal government's fiscal year.

Sources: Based on EIA analysis and financial data obtained from Global Insight; Original Source: Moody's Investor Services. Federal Reserve Bank's Form H-15. Tennessee Valley Authority SEC 10-K, 2006. Bonneville Power Administration 2006 Annual Report. Southeastern Power Administration 2005 Annual Report, Southwestern Power Administration 2004-2006 Annual Report and Western Area Power Administration 2006 Annual Report.

Based on an A bond rating, the estimate of the RUS generation-related interest rate support is $43 million of which $25 million is allocated to coal-fired capacity and $15 million to natural gas-fired and oil-fired capacity (Table 32). The support allocated to nuclear generation is $3 million, or 6 percent of the total generation-related subsidy. While RUS provided a substantial amount of loan guarantees for nuclear plants in the late 1970s and early 1980s, many of these assets were sold to investor-owned utilities in conjunction with bankruptcy reorganization plans and consensual debt-restructuring agreements.

Table 32. Allocation of RUS Interest Support by Fuel Type

Fuel Type	Summer Capability (MW)	Summer Capability (percent)	Support by Fuel Type (million 2007 dollars)
Coal	22,383	56	25
Natural Gas and Oil	13,474	35	15
Nuclear	2,238	6	3
Hydroelectric	804	2	*
Renewable	55	*	*
Total	38,954	100	43

NOTE: Totals may not equal sum of components due to independent rounding. RUS support values are calculated on calendar year balance sheet data.

*Less than 0.5 percent, or less than $500 million.

Sources: Based on EIA analysis and data obtained from Rural Utilities Service, *2005 Statistical Report of Rural Electric Borrowers*, Publication 201-1, and (December 2006). Energy Information Administration, Form EIA-860, "Annual Electric Generator Report," 2006. EIA analysis.

Transmission, Distribution, and Other Subsidies and Support for Electricity Production

Approximately $1.2 billion in subsidies and support are directed to transmission, distribution, and general plant (Table 33). These subsidies and support include the interest support associated with the transmission and distribution assets owned by the Federal utilities and transmission and distribution loans made by the RUS. Also included in this category are transmission-related tax expenditures that were created to provide incentives for transmission owners to invest in transmission infrastructure and restructure ownership or operational control of transmission facilities consistent with Federal Energy Regulatory Commission policies. A third component consist of R&D expenditures. The tax credit for fuel cells and microturbines, was included in this category. They are forms of distributed or dispersed generation that be used as a substitute for transmission and distribution facilities. Therefore the subsidy was included in this category. Finally, the exclusion from gross income of interest on certain energy facilities was included in this category because of a lack of data to allocate this tax expenditure by fuel type.

Of the $1.2 billion of electricity subsidies not directly related to production, nearly one-half ($530 million) is associated with the favorable treatment of the gain realized from the sale of transmission assets to an independent transmission company (Table 33). The purpose of this tax expenditure was to reduce the immediate tax burden associated with the sale of transmission assets by deferring recognition of the gain over a 4-year period to be ratably recovered over 8 years. The extent to which the Treasury Department's estimate of this subsidy is realized depends on the number of qualified transactions that occur prior to the provision's expiration on December 31, 2008. Since the enactment of this provision in Section 909 of the AJCA, and the extension of the sunset to December 31, 2007, in Section 1305 of EPACT2005, only one such transaction has been approved by FERC and closed. Another transaction is pending approval by various State regulatory commissions and the FERC.

Both transactions involve the acquisition of investor-owned utility properties by operating subsidiaries of ITC Holdings.[208] The first transaction involved the ITC Holdings' subsidiary ITC Transmission Company's acquisition of Michigan Electric Transmission Company LLC and Trans-Elect NTD Path 15, LLC. The transaction was approved by the FERC on September 21, 2006. The second transaction, which was announced in early 2007, involved ITC Midwest's acquisition of the transmission facilities of Interstate Power & Light Company. FERC approval of the acquisition is pending, as are approvals by a number of Midwest State regulatory commissions. The second largest expenditure is the interest rate support applicable to the Federal utilities and RUS associated with transmission, distribution, and general plant.

Table 33. FY 2007 Electricity Transmission, Distribution, and Other Subsidies and Support (million 2007 dollars)

Program Subsidy and Support Categories	Subsidy and Support
RUS Other Electric Plant	262
SWPA Other Electric Plant	8
WAPA Other Electric Plant	40
BPA Other Electric Plant	46
TVA Other Electric Plant	5
Electricity Delivery and Reliability (Electricity Technologies)	137
Direct Thermal to Electric Conversion	3
Treatment of Income of Certain Electric Cooperatives	14
5-Year Net Operating Loss Carryover for Electric Transmission Equipment	43
Transmission Property Treated as 15-Year Property	18
Deferral of Gain from Dispositions of Transmission Property to Implement FERC Restructuring Policy	530
Credit for Business Installation of Qualified Fuel Cells and Stationary Microturbine Power Plants	90
Exclusion of Interest on Bonds for Certain Energy Facilities	40
Total	1,235

NOTE: Total may not equal sum of components due to independent rounding.

Sources: Office of Management and Budget, *Budget of the United States Government, Fiscal Year 2008-Appendix*, Office of Management and Budget*, Analytical Perspectives Budget of the United States Government, Fiscal Year 2008*, *Federal Receipts and Collections*. See, http://www.whitehouse.gov/omb/budget/fy2008/. Joint Committee on Taxation, "Estimated Budget Effects Of The Conference Agreement on Title XIII of H.R. 6, The Energy Tax Incentives Act Of 2005," JCX59-05, July 27, 2005. Energy Information Administration, *Electric Power Annual 2006*, DOE/EIA-0348 (2006) (Washington, DC, November 2007). Energy Information Administration, Form EIA-906, "Power Plant Report;" Form EIA-920 "Combined Heat and Power Plant Report;" October 2006-September 2007. Tennessee Valley Authority SEC 10-K, 2006. Bonneville Power Administration, 2006 Annual Report. Southeastern Power Administration, 2005 Annual Report, Southwestern Power Administration, 2004-2006 Annual Report and Western Area Power Administration, 2006 Annual Report.

Collectively, the interest support for non-generation-related assets owned or financed by these entities totals $361 million. This is followed by transmission and delivery R&D at $137 million. Because all types of generation benefit from non-discriminatory open access, increased reliability, and new technology, this support is allocated to electricity production in general rather than to a specific fuel or technology.

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[208] In a September 2007 Press Release, ITC Holdings described itself as the "only publicly-traded company engaged exclusively in the transmission of electricity in the US Source: ITC Holdings, http://investor.itc-holdings.com/releasedetail.cfm?releaseid=264581.

Per-Unit Electricity Subsidies by Fuel Type

When grouped by type of subsidy, tax expenditures account for $4.3 billion of the estimated $6.7 billion in electric production subsidies (Table 34). R&D is the second largest category of subsidies at $1.7 billion. When allocated by fuel type fuel type, refined coal alternative fuel production tax credits account for one-half at $2.2 billion, followed by nuclear at $1.3 billion and non-fuel specific electricity subsidies at $1.2 billion. Renewable electricity production received an estimated $1.0 billion in subsidies, of which $724 million consists of tax expenditures.

Table 34. Fiscal Year 2007 Electricity Production Subsidies and Support (million 2007 dollars)

Fuel/Other	Direct Expenditures	Tax Expenditures	Research & Development	Federal Electricity Support	Total
Coal	-	264	522	68	854
Refined Coal	-	2,156	-	-	2,156
Natural Gas and Petroleum Liquids	-	203	4	20	227
Nuclear	-	199	922	146	1,267
Renewables	3	724	108	173	1,008
Transmission and Distribution	-	735	140	360	1,235
Total	3	4,281	1,696	767	6,747

NOTE: Totals may not equal sum of components due to independent rounding.

Sources: Office of Management and Budget, *Budget of the United States Government Fiscal Year 2008-Appendix*, Office of Management and Budget, *Analytical Perspectives Budget of the United States Government, Fiscal Year 2008, Federal Receipts and Collections*. See, http://www.whitehouse.gov/omb/budget/fy2008/. Joint Committee on Taxation, "Estimated Budget Effects Of The Conference Agreement For Title XIII Of H.R. 6, The Energy Tax Incentives Act Of 2005," JCX59-05, July 27, 2005. Energy Information Administration, *Electric Power Annual 2006*, DOE/EIA-0348(2006) (Washington, DC, November 2007). Energy Information Administration, Form EIA-906, "Power Plant Report;" Form EIA-920 "Combined Heat and Power Plant Report;" October 2006-September 2007. Tennessee Valley Authority SEC 10-K, 2006. Bonneville Power Administration 2006 Annual Report. Southeastern Power Administration 2005 Annual Report. Southwestern Power Administration 2004-2006 Annual Report and Western Area Power Administration 2006 Annual Report.

The per-unit subsidies are calculated as the subsidies allocated to each fuel type divided by the FY 2007 electricity generated by each fuel type (Table 35). Refined-coal-related generation receives the largest subsidy in absolute terms, at roughly $2 billion, as well as the highest per-unit value at $29.81 per megawatthour. Renewable electricity production, in aggregate, received subsidies totaling $1.0 billion, but the per-unit subsidy in aggregate is $2.80 per megawatthour. On a fuel-specific basis, solar and wind subsidies receive the second-and-third highest per unit subsidies. However, the total value of subsidies received by each of these technologies was roughly in proportion to their relative share of net generation. As, a result, their respective per-unit subsidies are nearly equal. In the case of solar, the per-unit subsidy estimate of $24.34 per megawatthour is a function of the relatively high allocation of subsidies received, $14 million, and its low share of total electricity production. Wind received $724 million in subsidies, valued at $23.37 per megawatthour.

Table 35. Subsidies and Support to Electricity Production: Alternative Measures

Fuel/End Use	FY 2007 Net Generation (billion kilowatthours)	Alternative Measures of Subsidy and Support	
		Subsidy and Support Value 2007 (million dollars)	Subsidy and Support Per unit of Production (dollars/megawatthours)
Coal	1,946	854	0.44
Refined Coal	72	2,156	29.81
Natural Gas and Petroleum Liquids	919	227	0.25
Nuclear	794	1,267	1.59
Biomass (and Biofuels)	40	36	0.89
Geothermal	15	14	0.92
Hydroelectric	258	174	0.67
Solar[1]	1	14	24.34
Wind	31	724	23.37
Landfill Gas	6	8	1.37
Municipal Solid Waste	9	1	0.13
Unallocated Renewables	NM	37	NM
Renewables (subtotal)	360	1,008	2.80
Transmission and Distribution	NM	1,235	NM
Total	4,091	6,747	1.65

NOTES: Total may not equal sum of components due to independent rounding.

Unallocated renewables include projects funded under Clean Renewable Energy Bonds and the Renewable Energy Production Incentive.

NM = Not meaningful.

[1]Net generation rounded to the nearest whole number. The actual value is 583 million kilowatthours.

Sources: Energy Information Administration, Forms EIA-906, "Power Plant Report;" Form EIA-920, "Combined Heat and Power Plant Report;" October 2006-September 2007.

Of the $9.8 billion in energy subsidies not related to electricity (Table 36), about one-third of the total promotes fuels, particularly ethanol and biodiesel, which are eligible to receive a blender's credit under the Volumetric Ethanol Excise Tax Credit (VEETC). Blenders receive a $0.51 per gallon credit for each gallon of ethanol that is blended with gasoline for use as a motor fuel. In FY 2007, ethanol (and biofuels) consumption was just over half a quadrillion Btu, or about one half of one percent of all the energy consumed in the United States. On a consumption basis, ethanol is subsidized at a rate of $5.72 per million Btu, more than any other non-electric fuel.

About 60 percent of all fuel consumed in the United States is consumed by primary end-use sectors, i.e., residential, commercial, industrial and transportation. In FY 2007 subsidies for petroleum liquids and natural gas totaled $2.1 billion. Although natural gas-fired generation has increased 86 percent between 1997 and 2007, power sector consumption of natural gas has increased only slightly as a share of total energy consumption in the United States, growing from around 5 percent of the national total to just under 7 percent. So, of the $2.1 billion in total natural gas and petroleum liquids subsidies, $1.9 billion are allocated to the primary end-use

sectors with the remainder to electricity production. With over 60 percent of total energy consumption in the U.S. associated with natural gas and petroleum, the two fuels receive relatively small subsidies on a consumption unit basis, only about three cents per million Btu. Similarly, hydrogen, which is used in fuel cells and in a limited number of transportation pilot programs received $230 million in subsidies in FY 2007. However, consumption is so small that the subsidy per million Btu is not meaningful for comparison purposes in Table 36.

Subsidies totaling another $3.6 billion do not directly affect fuel production or specific fuel consumption. These programs focus on energy efficiency, conservation, and energy-related financial assistance to residential, commercial, and industrial end-users. The largest of these programs, the Low Income Home Energy Assistance Program (LIHEAP), provided $2.2 billion in FY 2007 to subsidize heating and cooling costs. No program information is available to determine the portion of the expenditure directed to the affected fuels, which include distillate fuel, natural gas, coal, and electricity.

Table 36. Energy Subsidies Not Related to Electricity Production: Alternative Measures

Category	Fuel Consumption (quadrillion Btu)	Alternative Measures of Subsidy and Support	
		FY 2007 Subsidy and Support (million 2007 dollars	Subsidy per million Btu (2007 dollars)
Coal	1.93	78	0.04
Refined Coal	0.16	214	1.35
Natural Gas and Petroleum Liquids	55.78	1,921	0.03
Ethanol/Biofuels	0.57	3,249	5.72
Geothermal	0.04	1	0.02
Solar	0.07	184	2.82
Other Renewables	2.50	360	0.14
Hydrogen	*	230	NM
Total Fuel Specific[1]	60.95	6,237	0.10
Total Non-Fuel Specific	NM	3,597	NM
Total End-Use and Non-Electric Energy	NM	9,834	NM

NOTES: Non-electric power industry refined coal consumption is based on the sum of monthly deliveries, in short tons, reported in the EIA publications cited below for FY 2007. Delivered refined coal to non-electric customers is converted to equivalent Btu consumption based on EIA's estimate of the average Btu content for refined coal deliveries to generators reported to EIA. Other renewables includes hydroelectric, wood, biomass losses and co-products, and hydroelectric power as reported in the sources noted below.

[1]Subsidy shown differs from that shown in Table 26 due to inclusion of fuels that have no role in electricity production, such as ethanol and other biofuels.

*Less than 500 trillion Btu.

NM = Not meaningful.

Totals may not equal sum of components due to independent rounding.
Sources: Energy Information Administration, *Monthly Energy Review December 2007,* DOE/EIA-0035 (2007/12) (Washington, DC, December 2007), Table 10.2a and 10.2b; Energy Information Administration, *Quarterly Coal Report,* DOE/EIA-0121 (2007/03Q) (Washington, DC, December 2007), Table 35; Energy Information Administration, *Quarterly Coal Report*, DOE/EIA-0121 (2006/04Q) (Washington, DC, March 2007), Table 38; Office of Management and Budget*, Budget of the United States Government, Fiscal Year 2008-Appendix*; Office of Management and Budget, *Analytical Perspectives Budget of the United States Government, Fiscal Year 2008, Federal Receipts and Collections*, http://www.whitehouse.gov/omb/budget/fy2008/; Joint Committee on Taxation, "Estimated Budget Effects Of The Conference Agreement For Title XIII of H.R. 6, The Energy Tax Incentives Act Of 2005," JCX59-05, July 27, 2005. (Washington, DC, November 2007); Energy Information Administration, Form EIA-860, "Annual Electric Generator Report," 2006; Form EIA-906, "Power Plant Report;" and Form EIA-920, and "Combined Heat and Power Plant Report," October 2006 through September 2007.

Perspectives on Electricity Subsidy Estimates

The issue of what constitutes a Federal government benefit is not without controversy. The intention of this analysis is not to assess all the cost differences faced by Federal utilities, cooperatives, public power, and the IOUs. There are numerous tax benefits and tax expenditures associated with ownership class. Electricity cooperatives are organized as tax-exempt organizations under Federal tax law. Publicly-owned utilities are tax-exempt and have the ability to issue lower-cost tax-exempt debt. IOUs benefit from accelerated depreciation, which defers taxes and lowers their cost of capital by increasing cash flow. These benefits flowed from decisions by individuals and communities on how, and from whom, they wished to acquire electric service during the period in which the Nation was electrified. In essence, tax laws were expected to allow for different ownership classes of electric utility assets. Whether the basis for tax and other benefits attributable to class ownership are equal, or not, remains a debatable question to industry analysts.

These tax expenditures and direct expenditures provide incentives for market participants to engage in behavior, e.g., capital investment decisions that will achieve a desired benefit to society. This includes reducing dependence on imported oil, promotion of the use of environmentally preferred renewable resources, and encouraging participation in transmission organizations that facilitate reliability and enhance competition in wholesale electricity markets.

EIA was requested to provide an estimate of electricity subsidies with fuel-specific effects on a per-unit basis. In developing the analytical framework for this study, EIA adopted an inclusive approach that encompasses all energy-related R&D, direct expenditures, and tax expenditures to which there was a direct or indirect connection to current or future electricity production. This approach leaves a number of issues open to further discussion and analysis:

- EIA recognizes, particularly with respect to tax expenditures that the economic sector that the statutory beneficiary of a specific tax expenditure may or may not be the economic beneficiary. However, the calculations made in this report assume full pass through of current subsidies and support to fuel producers and transporters to electricity production. The Incidence Theory suggests that if a tax credit is applicable to a good or service that is supply inelastic, the statutory beneficiary can be expected to retain the benefit of a tax-expenditure. Possibly, a more accurate result could be obtained by conducting either a general equilibrium or partial equilibrium analysis, or a statistical-based micro-data analysis for individual tax expenditures.

- Including R&D expenditures raises intertemporal equity issues when applied to current electricity production by fuel type. Inclusion of these subsidies can be justified on the basis that past R&D expenditures are reflected in generation technologies in use today. Moreover, these expenditures are representative of the current direction of energy policy of diversification of energy supply, energy security, and environmental protection. Additionally, the report recognizes that at times there is a continuum associated with applied research and tax expenditures. In certain instances, R&D produces technology for which there is only nascent demand because of the initial cost or perceived market risk that limits access to financing. Thus, tax incentives or direct expenditures may be necessary to overcome this barrier. The production tax credits available for the first 6 gigawatts of advanced technology nuclear capacity is a good example of the linkage between R&D and tax expenditures.

- Inclusion of Federal electricity programs is not intended to highlight or discriminate against a particular segment of the industry. EIA recognizes the methodology used for estimating the support is based on available data, and is subject to some uncertainty. However, generally accepted economic theory and empirical observation lead to the conclusion that the structure of Federal utilities confers a benefit on their customers through the belief by capital markets that there is an implicit Federal guarantee of their debt. EIA quantified this support using a capital cost method that provides an estimated range of interest rate support by comparing the interest expense for each entity at its embedded cost of debt to a range of interest rates. By providing an estimate of interest rate support between the Treasury rate and the lowest investment grade bond rating, alternative estimates of support may be inferred. Based on a comparison of the Federal utilities with comparably-structured government-owned wholesale producers, it was determined that a benchmark A rated bond interest rate was the most appropriate for a point estimate for this report.