Appendix B
Alternative Methods of Estimating Federal Electricity Subsidies and Interventions

Alternative Methods of Estimating Federal Electricity Financial Support

In Chapter 4 a measure of capital investment support (based on interest obligations) was used to measure Federal government support to Federally-owned utilities. This appendix presents two alternative measures of support: market price support and return on asset support. Due to data limitations, these measures of support were not deemed to be as accurate as the interest support described in Chapter 4. As such, the methodologies described below are of perhaps greater value than the specific estimates of support, which should be viewed as rough.

Market Price Support

The market price estimate of support involves the price differential for Federal power sold in wholesale electricity markets and investor-owned utility (IOU) power sold in wholesale electricity markets. It should be kept in mind that wholesale prices embody more than pure power costs. Often included in wholesale prices are such transaction specific items as: capacity fees, delivery fees, and fees for the use of facilities. This qualification, however, should not obscure the fact that electricity generation is the largest component of wholesale electricity prices[277] and that some Federal power is priced significantly below that of neighboring utilities.

There are a number of different measures of wholesale electricity prices. The one used in this analysis, "sales for resale," was the only available measure that could be readily derived from published EIA data. It was also used because Federal utilities sell almost all of their electricity in wholesale markets. In a competitive market, the prices charged by different companies for the same commodity would be similar, with some variation resulting from such factors as transportation costs, as competitive forces would not allow significant price differences to persist over time. Where well-functioning markets exist, market prices can be observed directly. If Federal utilities sell power at below-market prices, the value of their preferential rates is the difference between the revenues that would be earned by selling electricity at the market price and the actual revenues of the utility. In essence, this price differential amounts to the opportunity cost of Federal power. For several reasons, however, caution should be exercised in estimating competitive market prices for electricity. First, although U.S. electricity markets have become more competitive, they are still significantly regulated. Because the prices charged by IOUs for wholesale transactions are often based on their embedded costs, a true competitive price cannot be derived. Furthermore, Federal utilities are currently required to sell electricity at rates that cover both power and some non-power costs. These latter costs, including environmental protection and aid to irrigation, have been found to be relatively higher for Federal utilities than for most IOUs.[278]

Wholesale electricity flowing over the grid is fungible; however, it is not necessarily a liquid commodity in all regions of the country. Thus, the underlying terms and conditions of bilateral transactions, and power purchased and sold in centralized markets, must be relied upon to determine whether two or more transactions are similar for price comparison purposes. For example, the price of hourly opportunity sales, which reflects current market conditions, is not comparable to long-term requirements where the supplier assumes a contractual obligation to serve the customer's current and future needs, including the provision of reserve capacity. Essentially, these two transactions involve different goods, and the prices for them are not directly comparable. The market price approach implicitly assumes that wholesale power sales by Federal utilities are directly comparable to private-utility power sales within the same regions; however, this may not always be the case.

Still, Federal power is in general low-price power particularly when measured against electricity prices in regions without access to Federal electricity. In part, this is due to the historic role the Federal government has played in the development of the Nation's hydroelectric resources, particularly in the areas of the Columbia and Tennessee River valley basins. Much Federal power comes from relatively cheap hydroelectricity, some of which was built long ago when construction costs and interest rates were relatively low. Moreover, to a large measure, these original asset investments have been depreciated. In a purely rate-regulated environment, conventional ratemaking policy allows low-cost producers to pass on

[277] Energy Information Administration, Electric Power Annual, 2006, DOE/EIA-348(2006) (Washington, DC, Nov 2007), Table 8.3.
[278] TVA has substantial nonpower costs related to its substantial support of a water transportation network and its stewardship role as conservator of public lands. General Accountability Office, Bonneville *Power Administration, Better Management of BPA's Obligation to Provide Power is Needed to Control Future Costs*, GAO-04-694, (Washington, DC, July 2004), p. 18.

the benefits of cheap power to their customer base. In a regulated environment, selling relatively cheap power at below-market prices does not involve a form of government support, as long as the power is sold without preference. However, by law certain classes of customers, such as municipalities, cooperatives, etc., have preferential access to Federal electricity. Thus, one could argue that it is the policy of preference, not price, which is the conveyance of Federal government support. However, this conveyance has a value in any economic environment, whether rate-regulated or free market, but it can more readily be estimated in a market where prices are freely set by supply and demand.

As wholesale electricity markets have been making a transition to more complete competition (a transition that has been in effect for a number of years), market forces have played a greater role in determining price.[279] In contrast to the rate-regulated environment, in a pure market-based environment, low-cost power producers become profit maximizers. Whatever cost advantage these producers possess relative to their competitors could be captured in the form of rents. Low-cost producers would have little incentive to price their power at anything other than market clearing rates, which in a competitive environment would be equal to the industry's marginal cost of power. Moreover, in a pure market environment, producers would be free to sell their electricity to the highest bidders without the constraints of a preferential customer class. In a purely competitive environment, the extent to which Federal power prices fell below the prices charged for similar power by competing utilities would constitute Federal support to the buyers of Federal power.

Electricity Markets

The electricity market has two distinct segments, wholesale and retail power markets. Wholesale markets comprise the resale and purchase of electricity among utilities and nonutility power producers for sale to ultimate consumers. Wholesale trade transactions are categorized by the service provided: full or partial requirements, firm or non-firm, etc. Generally, different services have different associated costs of service and, under cost-of-service regulation, have different prices. Prices of wholesale electricity sales (including the PMAs) are subject to approval by the Federal Energy Regulatory Commission, with the exception of the TVA.[a] Retail electric sales are sales covering electrical energy supplied for residential, commercial, and industrial end-use purposes.

[a] The TVA and its regulatory exception are discussed later in this chapter.

A comparison is made in this appendix between wholesale power prices charged by the four power marketing administrations (PMAs), along with the Tennessee Valley Authority (TVA), and wholesale prices charged by nearby IOUs. The intent of the comparison is to ascertain whether Federal utilities provide power at rates below those charged by neighboring IOUs, thus providing their customers with an advantage unavailable to other consumers. Accordingly, the value of the price differential between rates charged by Federal utilities and those charged by neighboring IOUs should be seen as a rough estimate of any price advantage enjoyed by the customers of Federal utilities.

Federal utilities as a group have mainly wholesale customers, none of their end-use customers are classified as residential or commercial.[280] In general, their end-use customers are bulk purchasers, such as the U.S. Department of Energy's National laboratories and aluminum smelters in the Pacific Northwest.

Although most Federal utilities' power prices are often set in advance (and in the case of the PMAs, with oversight by the U.S. Department of Energy and the Federal Energy Regulatory Commission), prices can fluctuate due to a number of circumstances. For instance, low water levels can force Federal utilities to purchase relatively high-cost power to meet their load needs. As a result, even though Federal utilities price their power in advance to meet their operational and borrowing needs, in some years Federal utilities post modest profits or losses. The PMAs also have some flexibility in terms of rate adjustments and in some years mid-year rate adjustments are needed to avoid losses. In making a rate adjustment, the PMAs are required to notify their customers through a Federal Register Notice, followed by public

[279] There have been some notable reversals in the trend toward State deregulation, such as in the cases of Arizona and Virginia.
[280] The customers of Federal utilities in turn sell Federal power to municipals, cooperatives, and IOUs do in turn sell that power to residential and commercial end users. For instance, the Memphis Light Gas and Water Division accounted for 9.1 percent of TVA's sales in 2006. Source: Tennessee Valley Authority, Tennessee Valley Authority 2006 Annual Report, p. 9.

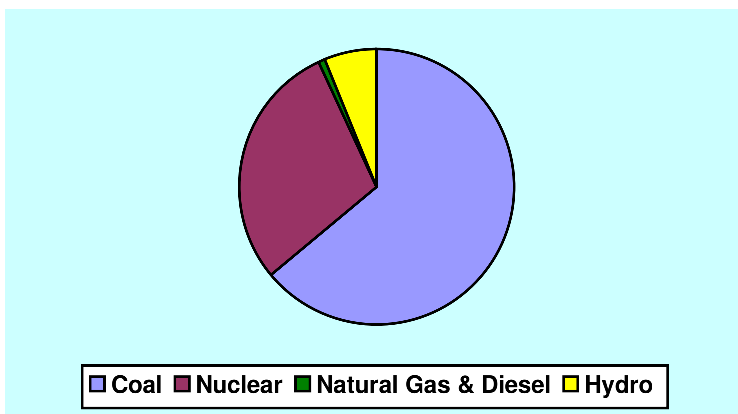
hearings.[281] The Secretary of Energy and the Federal Energy Regulatory Commission must approve any rate adjustments.[282]

TVA's Prices Relative to Neighboring IOUs

In 2006, TVA's average wholesale revenues were somewhat higher than the rates in the territories of neighboring utilities as measured by the Southeastern Electric Reliability Council (SERC) region's average wholesale power costs. In 2006, TVA's average wholesale revenues were 5.8 (2007 dollars) cents per kilowatthour, compared with an average of 5.5 cents per kilowatthour for utilities operating in the SERC region as a whole. As a result, EIA estimates an implicit negative subsidy value of $421 million is being paid for by recipients of TVA power. TVA's prices relative to SERC prices vary from year to year and in some years TVA's wholesale prices are greater than SERC prices and sometimes lower. Since 1998, TVA's prices have exceeded the SERC average wholesale prices in 5 years. In those years where TVA's prices fell below those of surrounding utilities, the price-based subsidy estimate would be positive.

TVA's current electricity prices in large measure reflect past investment decisions. TVA maintains an asset base which combines relatively low-cost hydroelectric and coal plants with relatively high- cost nuclear plants. Although the TVA faces very favorable variable costs largely due to its hydroelectric and coal plants, due to its inoperable nuclear power plants, its financing costs relative to revenues are significantly higher than neighboring utilities, thus raising TVA's fixed costs. Even though the TVA has not brought deferred assets and terminated nuclear assets of $5.4 billion (2007 dollars) into its rate base,[283] interest payments on the underlying borrowings are passed on to ratepayers and thus serve to elevate TVA's electricity prices.[284]

Figure B1. TVA Net Generation by Energy Source (percent)



Source: TVA, SEC 10-K, 2006.

Nuclear power accounted for 64 percent of TVA's investment in generating assets in 2006, while providing 29 percent of its gross generation (Figure B1). In contrast, fossil fuels and hydropower, which accounted for 33 percent of the utility's generation assets, provided 70 percent of its generation.[285] Due to its dependence upon coal and nuclear, and to a lesser extent hydro, TVA's variable costs tend to be low relative to surrounding utilities. However, this cost advantage is eroded to a great extent by TVA's high debt payments relative to surrounding utilities—a result of its past high-cost, nuclear-related investments.

BPA's Prices Relative to Neighboring Investor-Owned Utilities

More than 90 percent of the electricity sold by BPA is produced from Federal hydroelectric facilities; the remainder comes from one nuclear power plant. The average revenues derived from BPA's wholesale electricity sales are, in general, lower than those of competing utilities in BPA's operating region and much

[281] In a General Accountability Office report entitled *Power Marketing Administrations Repayment of Power Needs Closer Monitoring,* the GAO found Department of Energy and Federal Energy Regulatory Commission oversight on PMA rate adjustments to be perfunctory. *Power Marketing Administrations Repayment of Power Needs Closer Monitoring* GAO/AIMD-98-164 (Washington, DC, June 1998), pp. 7 and 8.
[282] Federal Energy Regulatory Commission (FERC) review is required under Department of Energy Delegation Order 0204-108. Department of Energy review is required under the Department of Energy Organization Act of 1977 (Public Law 95-91). Bonneville is an exception as it is required to only obtain FERC approval.
[283] At $3.3 billion (2007 dollars) in 2006, TVA's deferred assets and terminated nuclear assets were down substantially from the $7.8 billion in terminated nuclear assets in 1998
[284] Over the course of a year utilities' prices can fluctuate apart from any preset rates. In a low rainfall year, utilities are sometimes forced to purchase higher priced power to meet their load requirements.
[285] Tennessee Valley Authority SEC 10-K, 2006, pp. 11, 90 and 93.

lower than those of IOUs operating outside the Pacific Northwest. Clearly, BPA's lower average revenue is due to its heavy dependence on relatively inexpensive hydroelectric power. BPA hydroelectric capacity accounts for more than 90 percent of its total capacity. By comparison, 67 percent of the total capacity in the Pacific Northwest is hydroelectric. Only one major utility in the Pacific Northwest region sold more hydroelectricity than BPA, although, in general, other utilities in the region also tend to be heavily dependent on hydropower. The ample hydroelectric resources in the Pacific Northwest also allow neighboring utilities to charge rates substantially lower than those in the rest of the Nation.

Traditionally, electric power in the Northwestern United States has been much cheaper than in most of the rest of the country. In 2006, electricity prices averaged 9.04 cents (2007 cents) per kilowatthour for the United States as a whole, 5.01 cents per kilowatthour in Idaho, 6.28 cents per kilowatthour in Washington, and 6.68 cents per kilowatthour in Oregon (Table B1).

Table B1. Average Price per Kilowatthour for the United States, Selected States by End-Use Sectors, 2006 (2007 Cents per kWh)

State	All Sectors	Residential	Commercial	Industrial
Washington	6.28	6.96	6.69	6.47
Oregon	6.68	7.64	7.14	6.65
Idaho	5.01	6.25	5.23	5.54
Nationwide	9.04	10.63	9.57	6.22

Source: Energy Information Administration *Electric Power Monthly, March 2007*, DOE/EIA-0226 (2007/03) Table 5.6.B, http://tonto.eia.doe.gov/ftproot/electricity/epm/02260703.pdf. Accessed October 15, 2007.

Residential users in the Pacific Northwest are also among the beneficiaries of BPA's low-cost hydropower production. Residential electricity prices in Idaho averaged 6.25 cents per kilowatthour in 2006 (2007cents), the lowest in the United States. In contrast, the average price per kilowatthour for residential users in the United States as a whole was 10.63 cents. Similar price benefits were realized by commercial and industrial electricity consumers in the Pacific Northwest.

To measure the value of BPA's relative price advantage, a comparison was made between BPA's average wholesale revenue per kilowatthour and those of nearby utilities. In 2006, BPA's average revenue per wholesale kilowatthour was 3.0 cents (2007 cents), as compared with 4.8 cents for surrounding utilities (Table B2).[286]

Table B2. Implied Support for BPA Based on Market Rates,1998 and 2006 (million 2007 dollars)

Year	Wholesale Revenues (Million 2007 Dollars)	Revenues at Implied Market Prices (Million 2007 Dollars)	Implied Revenue Foregone (Million 2007 Dollars)	Average Prices of Wholesale Electricity Sales (2007 Cents per Kilowatthour)		Revenue Foregone per Unit of Electricity Sold (2007 Cents per Kilowatthour)
				WECC Regional Average	BPA Average	
1998	1,333,447	2,195,299	861,853	3.2	1.9	1.2
2006	2,716,306	4,333,116	1,616,809	4.8	3.0	1.8

Sources: Energy Information Administration, Form EIA-861, "Annual Electric Power Industry Report," 1998 and 2006.

[286] Energy Information Administration, Form EIA-861, "Annual Electric Power Industry Report, "

The difference in revenue provides a measure of the price support provided to the recipients of BPA's low-cost Federal power. If BPA were able to sell its electricity at the same prices as surrounding utilities, its revenues would increase by $1.6 billion (2007 cents). This amounts to the difference in revenues that would be realized by BPA if BPA raised its electricity rates to the levels of competing utilities, minus the revenue actually realized by BPA. In 1998, the implied revenue foregone associated with BPA's relatively lower prices was $862 million (2007 cents). Even though BPA saw an increase in its wholesale prices between 1998 and 2006, the percent increase in wholesale prices for surrounding utilities was even greater.

BPA's price advantage is in large measure due to its low-cost hydroelectric power plants, which were built with relatively cheap Federal government financing. Although its prices are among the lowest in the region, the utility has a high concentration of nonperforming assets and debt, which causes its prices to be higher than they would be otherwise. For the most part, BPA's nonproductive assets and debt, like those of TVA, were accumulated as a result of a large-scale nuclear power program occurring in the 1970s. BPA guaranteed much of the debt of the Washington Public Power Supply System (WPPSS), which was owned by a group of municipal utilities in Washington State. WPPSS began construction of five nuclear power plants in the mid-1970s, but the projects were beset by cost overruns, schedule delays, and mudslides. BPA is currently financing debt on three of the five nuclear power plants (Projects 1, 2, and 3).[287] In 2006, BPA carried $3.9 billion in partially completed nuclear power plants on its balance sheet.

BPA's wholesale electricity prices have risen considerably since 1998 but so too have those of competing utilities. In the future, BPA will have slightly more leeway in raising prices; effective Oct. 1, 2006, BPA has the ability to formulaically adjust rates up to $300 million annually to make up for any revenue shortfalls. In the fiscal year 2007 budget, the Office of Management and Budget proposed a revenue enhancer for BPA, stipulating that whatever profits BPA realizes as a result of a high precipitation year were to be used to pay down debt rather than to reduce rates.

PMA Prices Relative to Neighboring Investor-Owned Utilities

The prices charged by the three smaller PMAs are among the lowest available in the United States. Since their establishment, Congress has mandated that the three smaller PMAs sell their power at the "lowest possible rates consistent with sound business principles." Like BPA and TVA, the three smaller PMAs are required to provide certain classes of customers with preference power.

Average wholesale prices charged by the three smaller PMAs are considerably below those charged by nearby IOUs; however, they have increased significantly since 1998. The average price realized by SEPA in 2006 was 4.0 cents (2007 cents) per kilowatthour. Although considerably higher than the average price in 1998 (2.3 cents per kilowatthour), it was still cheaper than the surrounding North American Electric Reliability Corporation (NERC) region, (i.e., the Southeastern Electric Reliability Council or SERC). The SERC price was 5.5 cents per kilowatt hour in 2006 (Table B3).

For SWPA, the average wholesale price was 4.5 cents per kilowatthour (versus 1.7 cents in 1998), compared with 4.8 cents for neighboring IOUs in 2006. For WAPA, average wholesale prices equaled 2.4 cents (versus 1.9 cents in 1998) cents per kilowatthour, compared with 4.8 cents for neighboring IOUs in 2006. If the three smaller PMAs charged the same prices as those of competing IOUs, their combined average wholesale prices would climb by $873 million (2007 dollars). These differences in revenue and price can be viewed as a form of Federal support to the customers of the three smaller PMAs.

[287] Projects 4 and 5 defaulted on the dept in the 1980s, an event known at the time as the "Whoops Default." This default, at $2.25 billion, was the largest municipal default in U.S. history.

Table B3. Computation of Implied Support for Small PMAs on a Market Price Basis, 1998 and 2006 (millions 2007 dollars)

PMA	Wholesale Revenues (Million 2007 Dollars)	Revenues at Implied Market Prices (Million 2007 Dollars)	Implied Revenue Foregone (Million 2007 Dollars)	Average Prices from Wholesale Electricity Sales (2007 Cents per Kilowatthour)		Revenue Foregone per Unit of Electricity Sold (2007 Cents per Kilowatthour)
				Nearby NERC Regional Average	Federal PMA Average	
			Power Marketing Administration (1998)			
SEPA	208	455	247	5.1	2.3	2.8
SWPA	113	249	136	3.2	1.7	1.5
WAPA	770	1,263	493	3.2	1.9	1.3
			Power Marketing Administration (2006)			
SEPA	209	290	82	5.5	4.0	1.5
SWPA	106	117	11	4.8	4.5	0.3
WAPA	816	1,596	780	4.8	2.4	2.4

Sources: Energy Information Administration, Form EIA-861, "Annual Utility Report," 1998 and 2006, Southeastern 2005 Annual Report, Southwestern 2004-2006 Annual Report, and Western Area Power Administration 2006 Annual Report and corresponding 1998 reports.

Return on Asset Support

Another measure is used to estimate the value of Federal revenues forgone when returns on Federal electricity assets fall short of the returns on similar assets held by IOUs. This measure is comparable to the standard method used by electricity regulatory bodies to determine the appropriate rate base in reviews of IOU rate filings. Historically, the structure of the electric utility industry has been predicated on the concept that the industry was a natural monopoly. The result was traditional rate base regulation for IOUs, designed to protect consumers by ensuring reliability and a fair revenue requirement to electric utility shareholders. The revenue requirement was based on operating costs and a reasonable return on the rate base (invested capital) of the utility. Rate schedules were based on the cost of service for different customer classes and projected sales for each customer class to capture the necessary revenue requirement. This section compares Federal utility rates of return against those of IOUs to estimate the value of Federal support to consumers of Federal power.

Over the long term, IOUs must earn a sufficient return on invested capital to satisfy their shareholders. Historically, U.S. regulators have taken this into account when setting the price of electricity for private utilities. If sales of services provided by government-owned assets provide a below-market return on the assets, a preferential benefit is being conferred on customers. This approach measures the value of forgone Federal utility revenue required for the Federal utilities to realize a market rate of return on their assets, i.e., the “opportunity cost” of the return on those assets. A simplified textbook definition of cost for a private-sector electric utility equates with operating cost less depreciation of capital assets plus some allowance for cost of capital. The extent to which actual Federal utility earnings from electricity sales fall below what they would have earned by charging market rates consistent with IOU rates of return constitutes a support to the purchasers of Federal power, with the amount of the support equal to the difference between revenues sufficient to provide a market return on capital and revenues at the actual selling price.

Like the estimates of market price and interest rate support, estimates of return on asset support are not perfect measures of the support provided to the preferred customers of Federal utilities. As stated above, U.S. electricity markets are heavily regulated, and the assets utilities have in place today were not fully developed under competitive market conditions. There are also two notable distinctions between the IOUs and the Federal utilities. One, is Federal utilities are not subject to paying Federal taxes; the other is that Federal utilities do not have to raise equity, as they are entirely debt-financed. The return on asset calculation addresses these issues in part by comparing a Federal utility rates of return (net operating income over plant and equipment) with an IOU rate of return prior to taxation and payments of dividends (again net operating income over plant and equipment).

Although most Federal utility power prices are often set in advance (and in the case of the PMAs, approved by the U.S. Department of Energy and the Federal Energy Regulatory Commission), prices can fluctuate due to a number of circumstances. Low water levels can force Federal utilities to purchase power to meet their load needs. As a result, even though Federal utilities price their power to meet their operational and borrowing needs, in some years Federal utilities post modest profits or loses.

TVA's Return on Capital

The TVA sets electricity prices, unlike IOUs, not based upon a just and reasonable rate of return but instead based upon its cash requirements which include servicing its debt. The TVA needs neither Federal Energy Regulatory Commission nor State utility commission approval to set its rates. This report uses two measures of comparative financial performance to measure TVA's return on capital against the return on capital realized by IOUs. The first measure is net income before interest divided by net utility assets, without consideration of deferred assets such as TVA's inoperable nuclear plants. The second measure incorporates these assets of into the denominator.

IOUs as a group earned a 9.61-percent operating rate of return on investment in 2006 (Table B4). In contrast, TVA, excluding its deferred assets, realized a 7.16-percent rate of return and a 5.43-percent rate of return including its deferred assets in 2006.[288] Without its deferred assets, TVA's generating revenues sufficient to earn an 9.61-percent operating return for TVA would require that TVA increase its prices so that revenue rose by $509 million. To generate a rate of return equal to the IOUs when including TVA's deferred nuclear assets would imply a revenue increase of $1.1 billion.

Table B4. Tennessee Valley Authority's Return On Assets Estimates, 1998 and 2006

IOU Comparison	Net Plant and Equipment	Actual Revenue	Operating Income	Average Return (Percent)	Implied IOU Rate of Return (Percent)	Implied Federal Government Support	Operating Income with IOU Rate of Return
1998 (million 2007 dollars)							
No Deferred Assets	25,277	8,272	2,666	10.55	12 49	490	3,156
Deferred Assets	34,420	8,272	2,666	7.75	12.49	1,632	4,298
2006 (million 2007 dollars)							
No Deferred Assets	20,769	9,185	1,486	7.16	9.61	509	1,995
Deferred Assets	27,355	9,185	1,486	5.43	9.61	1,141	2,628

Sources: Tennessee Valley Authority, SEC 10-K, *2006* and 1998 Annual Report, FERC Form 1 data via Global Energy Decisions Inc.

The operating return on assets measures were chosen, rather than the more familiar net income or return on equity, in order to abstract from the differing roles of debt for public-sector versus private-sector utilities. Public-sector utilities sometimes have debt that equals or exceeds their assets, and they set prices so that there is little or no net income remaining after interest payments.

BPA's Return on Capital

As with the TVA, an assumption is made here that if BPA were to realize the same rate of return on assets as IOUs, then an appropriate adjustment to its prices, revenues, and operating income would be needed. Like the other Federal utilities, BPA is not expected, on average, to realize a positive rate of return. Rather, its rates are expected to cover costs and nothing more. A positive rate of return is possible, however, given unforeseen changes in the operating environment. For instance, BPA is heavily reliant on

[288] Because TVA does not pay Federal taxes, the after-tax and pre-tax net income values are the same. The TVA does make payments to States in lieu of taxes. These payments equaled $376 million in 2006, or about 4 percent of revenues (Source: Tennessee Valley Authority, Tennessee Valley Authority 10K 2006, p. 22.

hydropower. With rates set in advance, income can vary considerably based on annual precipitation in the Pacific Northwest.

The first measure of operating rate of return uses operating income over net utility assets excluding deferred nuclear assets. The IOUs realized a 9.61-percent rate of return in 2006, as compared with a 7.76-percent rate for BPA (Table B5). The second measure includes deferred regulatory assets as plant and equipment. In the case of BPA, its $4 billion in deferred assets are primarily related to its non-operational nuclear power plants. Excluding BPA's deferred assets, realizing a 9.61-percent rate of return would provide BPA with additional revenues of $294 million. Including BPA's deferred nuclear power plants in calculating a return on assets yields a 6.16-percent rate of return. Using this measure, BPA would have had to raise revenue by $693 million in order to achieve the IOU rate of return Although the interest costs associated with BPA's deferred nuclear power plants are recovered in BPA's prices, these facilities provide limited, if not negative value, to the utility's asset base.

Table B5. Return On Assets Estimates for Bonneville Power Administration, 1998 and 2006

IOU Comparison	Net Plant and Equipment	Actual Revenue	Operating Income	Average Return (Percent)	Implied IOU Rate of Return (Percent)	Implied Federal Government Support	Operating Income with IOU Rate of Return
1998 (million 2007 dollars)							
No Deferred Assets	18,445	2,844	1,073	5.82	12.49	1,230	2,303
Deferred Assets	23,680	2,844	1,073	4.53	12.49	1,883	2,957
2006 (millions 2007 dollars)							
No Deferred Assets	15,939	3,692	1,237	7.76	9.61	294	1,531
Deferred Assets	20,095	3,692	1,237	6.16	9.61	693	1,930

Sources: Bonneville Power Administration 1998 and 2006 Annual Reports and FERC Form 1 via Global Energy Decisions Inc.

PMA Returns on Capital

The method used to measure the difference between the returns on assets for the three smaller PMAs and those for the IOU comparison group is exactly the same as used for BPA and TVA. As a group the 3 PMAs realized revenue in excess of expenses in 2006 so their rate of return on investment was nearly zero.[289] The first measure of operating rate of return uses net income before interest and taxes divided by net utility assets. For the comparative IOUs this rate equaled 9.61 percent versus 0.77-percent for the 3 smaller PMAs. The two other measures incorporate the deferred assets of the IOUs—largely involving unfinished nuclear power plants—into a before-tax and after-tax basis.

Generating revenues sufficient to earn a 9.61-percent operating return for three smaller PMAs would require that they increase their prices sufficient to achieve a revenue gain of $512 million (Table B6) versus $735 million to realize the IOU 12.49-percent rate of return seen in 1998. The 3 smaller PMAs carry no significant inoperable plant and equipment.

[289] Note: For SWPA, balance sheet data for the Army Corp of Engineers assets were not available for the years 2004 through 2006. For WAPA and SEPA, 2006 data were not available. As a consequence, subsidy data were extrapolated based upon the latest reported data year using the gross domestic product (GDP) implicit price deflator. Also note that the Western Area Power Administration reported a loss in 2006, as it did in the prior 6 years. These losses have been attributable to an unusually low precipitation in the western United States.

Table B6. Three Smaller PMAs Returns on Net Power Plant and Equipment (million 2007 dollars)

IOU Comparison	Net Plant and Equipment	Actual Revenue	Operating Income	Average Return (Percent)	Implied IOU Rate of Return (Percent)	Implied Federal Government Support)	Operating Income with IOU Rate of Return
1998 (millions 2007 dollars)							
No Deferred Assets	7,343	1,070	182	2.48	12.49	735	917
Deferred Assets	7,343	1,070	182	2.48	12.49	735	917
2006 (millions 2007 dollars)							
No Deferred Assets	5,795	1,131	44	0.77	9.61	512	557
Deferred Assets	5,795	1,131	44	0.77	9.61	512	557

Sources: Western Area Power Administration 2006 Annual Report, Southwestern Power Administration 2004-2006 Annual Report, Southeastern Power Administration 2005 Annual Report. FERC Form 1 data via Global Energy Decisions Inc.

Appendix C
Historic Perspectives on Energy Tax Expenditures

Historic Perspectives on Energy Tax Expenditures

This appendix provides a historic perspective on energy-related tax expenditures in the United States. The Treasury Department began to report tax expenditures in 1967 (Table C1). The reporting of tax expenditures as a part of the budget process was mandated by the Congressional Budget Act of 1974 (Public Law 93-344). The budget of the U.S. Government defines tax expenditures as "revenue losses due to preferential provisions of the Federal tax laws, such as special exclusions, exemptions, deductions, credits, deferrals, or tax rates." Although the concept of what constitutes a tax expenditure is clear, the determination of what exactly is a preferential provision is subject to interpretation. In preparing this section on energy-related tax expenditures, the EIA relied entirely on the definitions of tax expenditures presented in Office of Management and Budget (OMB) documents and the staff of the Joint Committee on Taxation.

Energy policy has been shaped by the prevailing condition of the overall economy, political concerns, and the condition of energy markets. The introduction of new tax expenditures are generally associated with major milestones in energy policy. As a result, the focus of energy-related tax expenditures has changed considerably over time. The earliest energy-related tax expenditures go back to World War I and were directed at encouraging more domestic oil and natural gas production. The expensing of exploration and production and percentage depletion were the primary agents used to achieve this goal.[290,291] Prior to the second oil embargo of 1979, oil and natural gas remained the focus of most tax expenditures.

In 1967, overall energy tax expenditures were estimated at $8.0 billion (2007 dollars). There were only three energy-related tax expenditures reported that year. Excess over cost depletion, at $6.4 billion (2007 dollars) was far and away the largest tax expenditure for that year, amounting to 81 percent of all revenue foregone as a result of energy-related tax expenditures. Between 1967 and 2007, the estimated loss was equal to $108 billion.[292] The next largest item, expensing of exploration and development costs, was estimated at $1.5 billion (2007 dollars). Since 1967, the revenue losses associated with this expenditure are estimated to be roughly $54 billion.[293] Capital gains treatment from royalties on coal came in third in 1967, at $25 million (2007 dollars).

[290] Expensing of exploration and development costs was based on regulations issued in 1916 while the excess of percentage over cost depletion appeared in 1926. The percentage over cost depletion stems from the Revenue Act of 1916 which first recognized that the depletion of oil and natural gas as a tax deduction. Source: Congressional Budget Office, Tax Expenditures Budget Control Options and Five-Year Budget Projections for Fiscal Years 1983-1987 (Washington, DC, November 1992), Table C1.
[291] A court invalidated the expensing of exploration and development costs in 1945, but Congress subsequently gave its approval to the treatment, and it became law in 1954.
[292] Based upon estimates appearing in the United States General Accounting Office publication, *Petroleum and Ethanol Fuels: Tax Incentives and Related GAO Work*, GAO/RCED-00-301R (Washington, DC, September 2000) and data appearing in the Office of Management and Budget's *Analytical Perspectives of the U.S. Budget* 2008, 2006, 2004, and 2002.
[293] Based upon estimates appearing in the United States General Accounting Office publication, *Petroleum and Ethanol Fuels: Tax Incentives and Related GAO Work*, GAO/RCED-00-301R (Washington, DC, September 2000) and EIA estimates based upon data appearing in the Office of Management and Budget's *Analytical Perspectives of the U.S. Budget* 2008, 2006, 2004, and 2002.

Table C1. Current and Historic Tax Expenditures, Selected Years, 1967 to 2007 (million 2007 dollars)

	1967	1974	1976	1981	1984	1992	1996	2004	2005	2006	2007
Expensing of Exploration and Development Costs	1,489	2,835	2,375	5,537	2,226	-76	-265	282	410	695	860
Expensing of Tertiary Outlays	-	-	-	-	-	27	-	-	-	-	-
Exception from Passive Loss Limitation for Working Interests in Oil and Gas Properties	-	-	-	-	-	110	63	22	42	31	30
Excess of Percentage over Cost Depletion	6,453	7,240	4,662	5,366	3,629	1,023	1,422	672	621	777	790
Capital Gains Treatment of Royalties on Coal	25	17	177	181	324	14	19	76	95	164	170
Alternative Fuel Production Credit	-	-	-	50	35	618	720	1,127	2,441	3,046	2,370
Alcohol Fuel Credit	-	-	-	-	9	110	13	33	42	51	50
Exclusion of Interest on state and local Industrial Development Bonds used for Energy Production Facilities	-	-	-	-	53	172	398	-	-	-	-
Exclusion of Interest on Energy Facility Bonds	-	-	-	-	-	-	-	108	84	41	40
Enhanced Oil Recovery	-	-	-	-	-	-	101	358	316	-	-
Residential Energy Credits	-	-	-	231	-	-	-	-	-	-	-
New Technology Credit	-	-	-	-	-	62	38	358	252	521	690
Alternative Conservation and New Technology Credits Supply Incentives	-	-	-	451	368	-	-	-	-	-	-

Table C1. Current and Historic Tax Expenditures, Selected Years, 1967 to 2007 (million 2007 dollars)

	1967	1974	1976	1981	1984	1992	1996	2004	2005	2006	2007
Residential Energy Credits Conservation Incentives	-	-	-	853	-	-	-	-	-	-	-
Tax Credit and Deduction for Clean-Burning Vehicles and Properties	-	-	-	-	-	-	82	-	-	-	-
Tax Credit and Deduction for Clean-Burning Vehicles	-	-	-	-	-	-	-	76	74	112	260
Alternative Conservation and New Technology Credits Conservation Incentives	-	-	-	592	61	-	-	-	-	-	-
Alcohol Fuel Exemption	-	-	-	177	377	747	847	1,571	1,578	2,627	2,990
Exclusion from Income of Conservation Subsidies Provided by Public Utilities	-	-	-	-	-	-	190	108	84	112	110
Credit for Holding Clean Renewable Energy Bonds	-	-	-	-	-	-	-	-	-	20	60
Deferral of Gain From Dispositions of Transmission Property to Implement FERC Restructuring Policy	-	-	-	-	-	-	-	-	-	634	530
Credit for Production from Advanced Nuclear Power Facilities	-	-	-	-	-	-	-	-	-	-	-
Credit for Investment in Clean Coal Facilities	-	-	-	-	-	-	-	-	515	-	30
Temporary 50-Percent Expensing for Equipment used in the Refining of Liquid Fuels	-	-	-	-	-	-	-	-	-	10	30
Pass Through from Sulfur Diesel Expensing to Cooperative Owners	-	-	-	-	-	-	-	-	42	-	-

Table C1. Current and Historic Tax Expenditures, Selected Years, 1967 to 2007 (million 2007 dollars)

	1967	1974	1976	1981	1984	1992	1996	2004	2005	2006	2007
Natural Gas Distribution Pipelines being Treated as 15-Year Property	-	-	-	-	-	-	-	-	-	20	50
Amortized all Geological and Geophysical Expenditures over 2 Years	-	-	-	-	-	-	-	-	-	10	60
Allowance for the Deduction of Certain Energy Efficient Commercial Building Property	-	-	-	-	-	-	-	-	-	82	190
Credit for Construction of New Energy Efficient Homes	-	-	-	-	-	-	-	-	-	10	20
Credit for Energy Efficiency Improvements to Existing Homes	-	-	-	-	-	-	-	-	-	235	380
Credit for Energy Efficient Appliances	-	-	-	-	-	-	-	-	-	123	80
30 % Credit for Residential Purchase/Installation of Solar and Fuel Cells	-	-	-	-	-	-	-	-	-	10	10
Credit for Business Installation of Qualified Fuel Cells and Stationary Microturbine Power Plants	-	-	-	-	-	-	-	-	-	82	90
Alternative Fuel and Fuel Mixture Tax Credit	-	-	-	-	-	-	-	-	158	-	-
Partial Expensing for Advanced Mine Safety Equipment	-	-	-	-	-	-	-	-	-	-	10
Expensing of Capital Goods with Respect to Complying with EPA Sulfur Regulations	-	-	-	-	-	-	-	-	11	10	10
Biodiesel and Small Agri-Biodiesel Producer Tax Credits	-	-	-	-	-	-	-	-	32	92	180

Table C1. Current and Historic Tax Expenditures, Selected Years, 1967 to 2007 (million 2007 dollars)

	1967	1974	1976	1981	1984	1992	1996	2004	2005	2006	2007
Exclusion of Special Benefits for Disabled Coal Miners	-	-	-	-	-	-	-	-	-	51	50
Transmission Property Treated as Fifteen-Year Property	-	-	-	-	-	-	-	-	-	3	18
Five-Year Net Operating Loss Carryover for Electric Transmission Equipment	-	-	-	-	-	-	-	-	-	74	43
Treatment of Income of Certain Electric Cooperatives	-	-	-	-	-	-	-	-	-	-	14
84-Month Amortization of Certain Pollution Control Facilities	-	-	-	-	-	-	-	-	2	10	30
Nuclear Decommissioning	-	-	-	-	-	-	-	-	-	123	199
Total	7,967	10,092	7,214	13,260	7,082	2,779	3,627	4,790	6,956	9,775	10,444

NOTE: Values for the Alcohol Fuel Credit were unobtainable for the years prior to 1996.

Sources: Office of Management and Budget, *Analytical Perspectives, 2006-2008*, Table 19-1. Congressional Budget Office, *The President's Fiscal Year 1979 Tax Expenditure Proposals*, (Washington, DC, April 1978); Congressional Budget Office, *The Effects of Tax Reform on Tax Expenditures*, (Washington, DC, March 1988), Table A-1, and Energy Information Administration, *Federal Energy Subsidies, Federal Interventions in Energy Markets*, (SR/EMEU/92-02)(Washington, DC, February 1992).

The late 1970s saw a second world oil supply shock and heightened environmental concerns brought on by a nuclear accident at the Three Mile Island nuclear plant and the Love Canal disaster. During this period, energy policy attempted to address energy security and environmental protection. In order to address prevailing gasoline shortages, the National Energy Act of 1978 (NEA 1978, Public Law 95-618) came into law. NEA 1978 included an alcohol fuels excise exemption, which eventually became one of the largest energy-related tax credits by the mid-1990s, and the largest tax expenditure in the year 2007. An important component of NEA 1978 was the Energy Tax Act. ETA 1978 established a 10-percent business investment tax credit for solar photovoltaic projects. The Act also established a 15-percent energy tax credit added to an existing 10-percent investment tax credit for solar thermal and wind generation facilities. For residences, ETA 1978 established a credit of 30 percent for the first $2,000 invested and 20 percent for the next $8,000 for investment in solar and wind energy equipment. This credit, along with its production tax credit counterpart, eventually fell under the category of new technology credit as defined by the Treasury. ETA also implemented a percentage depletion rate of 22 percent for geothermal deposits for 1978 to 1980, and 15 percent after 1983.

In anticipation that the NEA's removal of domestically-produced crude oil price controls would quickly lead to higher prices, the Crude Oil Windfall Profit Tax of 1980 (Public Law 96-223) was signed into law. Prior to passage of the act, the price of most domestically-produced crude oil was regulated. A phase-out of price controls was determined to be necessary to increase domestic supply. The Crude Oil Windfall Profit Tax also introduced an alternative fuels credit. This credit was directed at promoting the use of unconventional fuels. The tax credit, initially set at $3.00 per barrel of oil equivalent, was directed at the following fuels: (1) oil produced from shale and tar sands; (2) natural gas produced from geopressurized brine, Devonian shale, coal seams, tight formations, or biomass; (3) liquid, gaseous, or solid synthetic fuel produced from coal liquefaction and pressurization; (4) fuel from qualified processed wood; and (5) steam from solid agricultural byproducts. The alternative fuel production credit is often referred to as the Section 29 credit based upon its former Internal Revenue Service code.[294] In 2007, the alternative fuel credit was the second largest tax expenditure.

The second oil price shock also gave rise to several tax expenditures focusing on conservation and producing alternative sources of energy. By 1981, energy-related tax expenditures had climbed to $13.3 billion. This was probably a historic highpoint for energy-related tax expenditures even though the U.S. economy was less than half its current size and the population was about 25 percent smaller than today.[295] Although traditional tax expenditures continued to grow, new expenditures focused on alternative fuels, technologies, and conservation. The expensing of exploration and development now exceeded excess of percentage over cost depletion and amounted to a revenue reduction at $5.5 billion (2007 dollars). The value of excess over cost depletion fell considerably from 1967, and in 1981 equaled $5.4 billion (2007 dollars). Due to such legislation as the Energy Tax Act of 1978 and the Windfall Profit Tax of 1980, the number of energy-related tax expenditures climbed to 12, although two expenditures had de minimis values. In 1981, new tax expenditures included: residential energy credits conservation incentives ($853 million), new technology conservation incentives ($592 million), alternative conservation and new technology credit supply incentives ($451 million), residential energy credits supply incentives ($231 million), and the alternative fuel production credit ($50 million). The alcohol fuel credit was in effect for the first time that year but with a de minimis value, as was the case of the exclusion of interest on State and local government industrial development bonds for energy production facilities.

After peaking in 1981, energy prices moderated. For most of the low-energy price 1980s, there was little in the way of new tax expenditure initiatives and the 1980s witnessed a diminishment of the role of the Federal government in providing tax incentives to promote energy supply. During the 1980s, the Energy Tax Act of 1978 business energy tax credits was allowed to expire. The Tax Reform Act of 1986 (Public Law 99-514) eliminated the 10-percent investment tax credit and extended the energy tax credit until 1988, but it reduced that credit from 15 percent to 10 percent and eliminated wind as a candidate for any credits. By 1984, energy-related tax expenditures had fallen sharply, and overall revenue reductions

[294] The Treasury refers to the credit as the alternative fuel production credit. The IRS calls the credit the nonconventional fuel source credit. The corresponding IRS code is Section 29. See: http://www.irs.gov/irb/2006-18_IRB/ar06.html . Also, see *Budget of the United States Government Analytical Perspectives, Fiscal Year 2008* (Washington, 2007), p. 301.

[295] Tax expenditures are revised every year but not for all historic data. Revisions only go back a couple of years so it is difficult to discern which exact year saw a peak in these revenue loses. In constant dollars it appears that they peaked in the early 1980s.

related to energy amounted to $6.7 billion (2007 dollars) as the value of some programs were reduced or allowed to expire altogether. The value of tax expenditures related to the capital gains treatment of royalties on coal, the exclusion of interest on State and local industrial development bonds for certain energy facilities, the alternative conservation and technology credits, the alternative fuel production credit, and the alcohol fuel credit all declined. In addition to the eight electricity-related tax expenditures listed in the budget for that year, there was one tax exemption (alcohol fuels tax exemption).

During the early 1990s, once again, concerns over energy security and the environment led to passage of an omnibus energy bill, the Energy Policy Act of 1992 (EPACT 1992) (Public Law 102-486). EPACT 1992 was the most significant piece of energy legislation since 1980. The tax provisions of EPACT1992 focused on providing incentives that encouraged energy efficiency, renewable energy, and alternative fuels. Some of these incentives were directed at geothermal, electric vehicles, and solar power. The business tax credit (EPACT1992, Section 1916), which had been extended on a year-to-year basis up until 1992, was established as a permanent 10- percent business energy tax credit for investments in solar and geothermal equipment. Section 1914 of EPACT1992 established a 10-year, 1.5 cents per kilowatthour (kWh) production tax credit (PTC) for wind projects (privately-owned and investor-owned) and biomass plants using dedicated crops (closed-loop) placed in service between 1994 and 1993, respectively, and June 30, 1999.[296]

In 1992, the value of all tax expenditures (including the excise tax exemption) was estimated at $2.0 billion (2007 dollars). By 1995, the value of tax expenditures (again, including the excise tax exemption) had risen to $3.9 billion (2007 dollars). Still this was far less than the estimated 1981 value of $13.3 billion (2007 dollars) even though the number of energy subsidies had grown from seven to ten. The percentage over cost depletion tax expenditure retained its major role in the order of tax expenditures. However, the value of the alternative fuel production credit began to gain prominence. In 1995, at an estimated at $1.2 billion, this credit accounted for almost one-third of total tax expenditures.

The 1990s began with the first Persian Gulf War and a brief surge in petroleum prices. However, for the remainder of the decade, energy prices remained stable and concerns over energy security were diminished. For over a decade, no omnibus energy legislation was passed after EPACT1992. During most of the 1990s, the number of energy-related tax expenditures remained the same. However, in dollar terms, the Section 29 credit grew considerably, rising from $18 million (2007 dollars) in 1983 to $2.4 billion by 2005 (2007 dollars). The value of the Section 29 credit is expected to fall by more than half by 2008 and then disappear after that as the credit is phased out.[297] Largely due to rapidly growing usage of wind to supply electricity, the production tax credit, reported by the Treasury under the category “new technology credit,” has been the fastest growing major tax expenditure over the last few years. The value of the new technology credit is expected to remain strong throughout the remainder of the decade. In 2008, the new technology credit is expected to be the second largest tax expenditure and the second largest tax expenditure directed toward renewables.

The Energy Policy Act of 2005 and Other Recently Enacted Energy Tax Expenditures

The Energy Policy Act of 2005 (EPACT2005) (Public Law 109-58) and accompanying legislation moved the orientation of energy tax expenditures further towards energy efficiency and electricity. EPACT2005 represented the first major piece of Federal government energy legislation to emerge since the Energy Policy Act of 1992 (EPACT1992). The purpose of EPACT2005 was to address several energy issues such as America’s growing dependence on imported oil, rising environmental concerns, electricity industry restructuring, and the reliability of the Nation’s transmission system.

EPACT2005 embodied several new energy initiatives as well as expanding on several tax expenditures already on the books. Mainly as a result of EPACT2005 and accompanying legislation, there were 38 tax expenditure programs listed in the U.S. budget in 2007 versus 11 in the 1999 budget. Those tax expenditures aimed at

[296] Closed-looped biomass consist of crops grown, in a sustainable manner, for the sole purpose of bioenergy and bioproduct uses, which might include annual crops, such as corn and wheat, perennial crops, such as trees and shrubs, and grasses, such as switchgrass. Open-looped biomass is biomass that can be used to produce energy even though it was not grown specifically for this purpose. Examples of open-loop biomass include agricultural livestock waste and residues from forest harvesting operations and crop harvesting.

[297] The current primary recipient of the fuel, synthetic coal, loses its eligibility after January 1, 2008.

energy production totaled $10.4 billion (2007 dollars) in fiscal year (FY) 2007, a substantial rise from $4.8 billion (2007 dollars) in 2004, the year prior to passage of EPACT2005. EPACT2005 was intended to double the use of biofuels. EPACT2005 also added a number of measures that encouraged households and businesses to engage in greater conservation efforts.

EPACT2005 contained several provisions for alternative fuels and advanced technologies. The expenditures focused on achieving greater end-use energy efficiency are, however, short-lived or of relatively small monetary value. Due to EPACT2005, nuclear power for the first time became a beneficiary of future Federal tax expenditures. The production tax credits (PTC) allocated towards nuclear as a result of EPACT2005 are substantial. The PTCs target the construction of "new technology" nuclear plants. The owners of eligible plants will receive a 1.8-cents-per-kilowatthour credit. The credit is in effect for the first 8 years of plant operation. The Treasury Department has not projected the value of this expenditure because it anticipates no new eligible plants in commercial operation within its current forecast horizon, which runs through 2012. EIA's *Annual Energy Outlook 2008* forecasts that 16,600 megawatts of new capacity will be added by 2030. Section 638 of EPACT2005 provided an insurance program, "standby support," which provides up to $500 million to defer costs resulting from construction delays for the first two reactors and $250 million for the next four reactors.

By one estimate, EPACT2005 provided for about $14.5 billion in tax expenditures over an 11-year period.[298] Of this amount, $4.5 billion was allocated to renewables, $3 billion to coal, $3 billion to electricity, and $2.6 billion to oil and natural gas.[299] EPACT2005 places a considerable emphasis on renewable energy.[300]

Other legislation enacted contemporaneously with EPACT2005 also had a noteworthy impact upon energy-related tax expenditures. The Job Creation and Worker Assistance Act of 2002 (Public Law 107-147) extended the PTC through 2003 in March 2002. The PTC expired at the end of 2003 and lapsed until October 2004. It was extended through the end of 2005 by Section 313 of the Working Families Tax Relief Act of 2004 (Public Law 108-311). Section 710 of the American Jobs Creation Act of 2004 (Public Law 108-357) expanded the PTC to include open-loop biomass, geothermal energy, solar energy, small irrigation power, and municipal solid waste (landfill gas and trash combustion facilities).

Section 909 American Jobs Creation Act of 2004 also included provisions, which for the first time, addressed investment incentives for expanding Nation's transmission grid. Although not an omnibus piece of energy-related tax legislation, the AJCA had a significant number of energy measures, the value of which is estimated at $5 billion.[301] The law amended the Internal Revenue Code to permit taxpayers to realize a gain from investments in qualifying electric transmission transactions ratably over an 8-year period if the gain from the sale is reinvested in certain exempt utility property. The law defined "qualifying electric transmission transaction" as the sale or other disposition before January 1, 2007, to an independent transmission company of: (1) property used in the trade or business of providing electric transmission services, or (2) any stock or partnership interest in such a trade. Section 1305 of EPACT 2005, extended the special tax treatment of capital through December 30, 2007.

In 2007, Congress also scaled back some of tax expenditures benefiting the oil and natural gas industry and to use the funds to promote renewable energy and energy efficiency. Title I of the Clean Energy Act of 2007 would have reduced oil and natural gas tax expenditures by $7.6 billion between 2007 and 2017.[302] These provisions were not included in the Energy Independence and Security Act of 2007 (Public Law 110-140).

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298 Congressional Research Service, *Energy Policy Act of 2005: Summary and Analysis of Enacted Provisions*, (Order Code RL33302) (Washington, DC, March 8, 2006), p. 3.
299 Congressional Research Service, *Energy Policy Act of 2005: Summary and Analysis of Enacted Provisions*, (Order Code RL33302) (Washington, DC, March 8, 2006), p. 3.
300 Ibid.
301 Congressional Research Service, CRS Report for Congress, *Energy Tax Policy: History and Current Issues*, (Order Code: RL33578) (Washington, DC, November 7, 2007), p. 11.
302 Congressional Budget Office, H.R. 6, Clean Energy Act of 2007, Letter to Congressman Rahall, Chairman of the Committee on Natural Resources, January, 2007. Estimates were provided by the Joint Committee on Taxation.

Synthetic Fuels Corporation

Oil shale has long been used as a fuel source for naval vessels. In the early 20th century, three oil major oil shale reserve deposits were dedicated for naval use. The United States has the largest know oil shale deposits. Most oil shale deposits lie in Colorado, Utah, and Wyoming. The United States is estimated to have as much as 1.8 trillion barrels of oil shale, although not all of that is currently treated as an economically-recoverable fuel.[303] One midpoint range of recoverable reserves estimates indicates that the United States has more than triple the proven reserves of Saudi Arabia.[304] Although a relic of the past, the long defunct Synthetic Fuels Corporation (SFC) bears mentioning in this report because at one time it was intended to be the largest direct expenditure program in the Nation's history outside of wartime. Direct Federal spending on energy-related projects totaled $2 billion in 2007. Relative to spending during the last oil price spike during the late 1970s and early 1980s, this value looks quite moderate. The SFC was established as a government agency in the midst of the second oil price shock by the Energy Security Act of 1980 (Public Law 96-294). In 1981, crude oil prices reached roughly $37 per barrel (or $73 per barrel in 2007 dollars)[305] with widespread expectations that they were destined to go much higher. The SFC was abolished under the Consolidated Omnibus Budget Reconciliation Act (Public Law 99-272) in 1986, when oil prices declined to near-record lows. At one point, Congress and the President were negotiating spending a possible $88 billion on the program. In 1979, the Interior Department and Appropriation Act (Public Law 96-126) and the Supplemental Appropriations Act (Public Law 96-304) budgeted $18 billion ($42 billion in 2007 dollars) in financial incentives. By the time the program was terminated, total spending was estimated at $8 billion. The Windfall Profit Tax of 1980 provided funding for the SFC which was directed to develop synthetic gas, liquids from tar sands, coal, and shale.

The intention was for the SFC to team with private sector entities to eventually develop 0.5 million barrels of oil equivalent a day by 1987 and 2 million barrels by 1992. In essence, the SFC was to be an independent Federal entity, which was to function as an investment bank. Before being legislated out of existence, SFC funded four projects with long-term price guarantees. A Congressional Research Service report released in 1983 described the endeavor: "the Federal government and U.S. industry are embarking on the largest and most intensive effort ever undertaken to increase the production of synfuels..."[306]

Oil shale is currently eligible for a couple of tax credits in the form of the percentage depletion and the Section 29 credit discussed above. The Section 29 credit grew out of the Windfall Profit Tax of 1980 which occurred around the time of the genesis of the SFC. EPACT2005 showed renewed interest in oil shale declaring that "the development of oil shale, tar sands, and other strategic unconventional fuels are strategically important domestic resources that should be developed to reduce the growing dependence of the United States on politically and economically unstable sources of foreign oil imports."[307] To that end, EPACT2005 called for the development of a leasing of Federally-owned lands. The Secretary of the Interior is directed to make land in the states of Colorado, Utah, and Wyoming available for research and development activities to develop technologies capable of recovering liquid fuels from oil shale. For the

[303] Congressional Research Service, Oil Shale: History, Incentives, and Policy, (Order Code RL33359) (Washington, DC, April, 2006), Summary.
[304] Bartis, James, T, et al, "Oil Shale in the United States, Prospects and Policy Issues," Rand Corporation, ISBN 0-8330-3848-6, Prepared for the Department of Energy's National Energy Technology Laboratory, 2005. This study estimated that the price of low-sulfur, light crude oil, such as Texas intermediate, would need to be at least $75 to $95 per barrel for a first-of-a-kind oil shale operation to be profitable.
[305] Prices are the average U.S. wellhead price. Source: Energy Information Administration, Annual Energy Review 2006 (DOE/EIA-0384 (2006) (Washington, DC, June 2007), Table 5.18
[306] Congressional Research Service, Synthetic *Fuels Corporation and National Synfuels Policy* (Issue Brief Number IB81139) (Washington, DC, February, 1983), p. 1.
[307] Section 369, Energy Policy Act 2005, Public Law 109-58.

first 10 years, the royalty rate will be set at 1 to 3 percent of the value of gross production with States receiving half the value. The Mineral Leasing Act of 1920 (MLA) authorized the leasing of land for developing deposits of coal, phosphates, petroleum, natural gas and other minerals. MLA limited the size of a lease tract to 5,120 acres with the further restriction of preventing any corporation or individual from obtaining any more than one lease. Section 369 of EPACT 2005 increased the size of a lease tract to 5,760 acres, and allowed an individual to obtain up to 50,000 acres of oil shale leases in any one State.

Appendix D
Description of
Bond Ratings

This appendix consists of a description of the various bond ratings used by bond-rating firm of Moody's Investor Services. The information was obtained from the State Treasury Office of the State of California.

Moody's - Definitions of Bond Ratings
Long-Term Issue Credit Ratings

Aaa	Bonds that are rated Aaa are judged to be of the best quality. They carry the smallest degree of investment risk and are generally referred to as "gilt edge." Interest payments are protected by a large or by an exceptionally stable margin and principal is secure. While the various protective elements are likely to change, such changes as can be visualized are most unlikely to impair the fundamentally strong position of such issues.
Aa	Bonds rated Aa are judged to be of high quality by all standards. Together with the Aaa group they comprise what are generally known as high grade bonds. They are rated lower than best bonds because margins of protection may not be as large as for Aaa securities, fluctuation of protective elements may be of greater amplitude, or there may be other elements present that make the long-term risks appear somewhat larger than in Aaa securities.
A	Bonds that are rated A possess many favorable investment attributes and are to be considered as upper medium grade obligations. Factors giving security to principal and interest are considered adequate, but elements may be present that suggest a susceptibility to impairment some time in the future.
Baa	Bonds that are rated Baa are considered as medium grade obligations, i.e., they are neither highly protected nor poorly secured. Interest payments and principal security appear adequate for the present but certain protective elements may be lacking or may be characteristically unreliable over any great length of time. Such bonds lack outstanding investment characteristics and in fact have speculative characteristics as well.
Ba	Bonds that are rated Ba are judged to have speculative elements; their future cannot be considered as well assured. Often the protection of interest and principal payments may be very moderate, and thereby not well safeguarded during both good and bad times over the future. Uncertainty of position characterizes bonds in this class.
B	Bonds that are rated B generally lack characteristics of the desirable investment. Assurance of interest and principal payments or maintenance of other terms of the contract over any long period of time may be small.
Caa	Bonds that are rated Caa are of poor standing. Such issues may be in default or there may be present elements of danger with respect to principal or interest.
Ca	Bonds that are rated Ca represent obligations that are speculative in a high degree. Such issues are often in default or have other marked shortcomings.
C	Bonds that are rated C are the lowest rated class of bonds, and issues so rated can be regarded as having extremely poor prospects of ever attaining any real investment standing.

NOTE: Since October 1996, Moody's has applied numerical modifiers 1, 2, and 3 in each generic rating classification from Aa to B. (see Moody's Expanded Public Finance Rating Symbols chart below). The modifier 1 indicates that the issue ranks in the higher end of its generic rating category, the modifier 2 indicates a mid-range ranking, and the modifier 3 indicates that the issue ranks in the lower end of its generic category.

Source: State of California, State Treasurers Office: http://www.treasurer.ca.gov/ratings/moodys.asp, accessed October 11, 2007.

Appendix E
Types of Loans Available Through the Rural Utilities Service

Hardship Loans

Eligible Facilities: Distribution, subtransmission, and headquarters (service & warehouse) facilities

Eligible Borrowers: Retail providers that meet rate disparity thresholds and whose consumers fall below average per capita and household income thresholds or that have suffered a severe, unavoidable hardship, such as a natural disaster, as determined by the RUS Administrator

Interest Rate: 5 percent

Supplemental Financing Required: No

Loan Term: Term of loan not to exceed useful life of the facilities being financed, with a maximum term of 35 years.

Municipal Rate Loans

Eligible Facilities: Distribution, subtransmission, and headquarters (service & warehouse) facilities

Eligible Borrowers: Retail providers for all facilities; power supply providers for subtransmission and headquarters facilities

Interest Rate: Interest rates will be established quarterly by RUS based on interest rates available in the municipal bond market for similar maturities and is determined at the time of the advance

Supplemental Financing Required: Yes, generally 30 percent, except in the case of financial hardship as determined by the RUS Administrator and the first loan following a merger or consolidation

Loan Term: Term of loan not to exceed useful life of the facilities being financed, with a maximum term of 35 years. Power supply borrowers' loan term is also based on the term of its wholesale power contracts.

Treasury Rate Loans

Eligible Facilities: Distribution, subtransmission, headquarters (service & warehouse), and renewable generation facilities

Eligible Borrowers: Retail providers for all facilities; power supply providers for renewable generation facilities

Interest Rate: Interest rates will be established daily by the United States Treasury and is determined at the time of each advance

Supplemental Financing Required: No

Loan Term: Term of loan not to exceed useful life of the facilities being financed, with a maximum term of 35 years. Power supply borrowers' loan term is also based on the term of its wholesale power contracts.

FFB Guaranteed Loans

Eligible Facilities: Distribution, transmission (bulk and subtransmission), generation, and headquarters (office, service and warehouse) facilities

Eligible Borrowers: Retail and power supply providers

Interest Rate: Interest rates will be established daily by the United States Treasury. Added to that rate is one-eight of 1 percent. The interest rate is determined at the time of each advance

Supplemental Financing Required: No

Loan Term: Term of loan not to exceed useful life of the facilities being financed, with a maximum term of 35 years. Power supply borrowers' loan term is also based on the term of its wholesale power contracts.

Eligible Borrowers

Eligible borrowers are corporations, States, territories, and subdivisions and agencies thereof, municipalities, people's utility districts, and cooperative, non-profit, limited-dividend, or mutual associations that provide retail or power supply service needs in rural areas

Rates

Current interest rates for these loan programs may be found on the RUS “Rates” web site (http://www.usda.gov/rus/electric/rates.shtml#ffb).

Specific language on loan eligibility and terms can be found in RUS Rules and Regulations 7CFR Part 1714 (http://www.usda.gov/rus/electric/fr2002/fr09ap02-01.pdf). Loan policies and application procedures can be found in 7CFR Part 1710.”

Source: Rural Utilities Service: http://www.usda.gov/rus/electric/loans.htm, accessed October 11, 2007.

Appendix F Table of Authorizations and Regulations

Table of Authorizations and Regulations

The laws and regulations below provided the legal basis for the programs discussed in this report.

Public Laws:

Public Law 72-154 Revenue Act of 1932
Public Law 73-17 Tennessee Valley Act of 1933
Public Law 75-329 Bonneville Projects Act 1937
Public Law 78-534 Flood Control Act of 1944
Public Law 82-183 Revenue Act of 1951
Public Law 90-364 Revenue Expenditure Control Act of 1968
Public Law 91-173 Tax Reform Act of 1969
Public Law 91-177 Federal Mine Safety and Health Act of 1977
Public Law 93-344 Congressional Budget Act of 1974
Public law 93-454 Columbia River Transmission Act of 1974
Public Law 94-12 Tax Reduction Act of 1975
Public Law 95-91 Department of Energy Organization Act of 1977
Public Law 95-227 Black Lung Benefits Revenue Act of 1977
Public Law 95-618 Energy Tax Act of 1978
Public Law 96-126 Interior and Related Agencies Appropriation Act of 1980
Public Law 96-223 Crude Oil Windfall Profits Tax of 1980
Public Law 96-294 Energy Security Act of 1980
Public Law 96-304 Supplemental Appropriations Rescission Act of 1980
Public Law 96-493 Gasohol Competition Act of 1980
Public Law 96-499 Omnibus Reconciliation Act of 1980
Public Law 97-35 Low Income Home Energy Act 1981
Public Law 97-424 Surface Transportation Assistance Act of 1982
Public Law 97-425 Nuclear Waste Policy Act of 1982
Public Law 98-369 Deficit Reduction Act of 1984
Public Law 99-178 Department of Labor, Health and Human Services and Education and Related Agencies Appropriation Act of 1986
Public Law 99-272 Consolidated Omnibus Budget Reconciliation Act of 1986
Public Law 99-499 Superfund Amendments and Reauthorization Act of 1986
Public Law 99-510 Tax Reform Act of 1986
Public Law 99-519 Tax Reform Act of 1986
Public Law 99-514 Tax Reform Act of 1986
Public Law 100-494 Alternative Motor Fuels Act of 1988
Public Law 100-647 Technical Miscellaneous Revenue Act of 1988
Public Law 101-508 Omnibus Budget Reconciliation Act of 1990
Public Law 101-549 Clean Air Act Amendments of 1990
Public Law 102-486 Energy Policy Act of 1992
Public Law 103-66 Omnibus Budget Reconciliation Act of 1993
Public Law 103-129 Rural Electric Loan Restructuring Act of 1993
Public Law 103-252 Human Service Amendments Act of 1994
Public Law 105-34 Taxpayer Relief Act of 1997
Public Law 105-178 Transportation Equity Act for the 21st Century of 1998
Public Law 106-51 Emergency Steel Loan Guarantee and Emergency Oil and Gas Guaranteed Loan
Public Law 106-170 Tax Relief Extension Act of 1999
Public Law 106-224 Agricultural Risk Protection Act of 2000
Public Law 107-171 Farm Security and Rural Investment Act of 2002
Public Law 107-147 Job Creation and Worker Assistance Act of 2002

Public Law 107-200 Yucca Mountain Development Act of 2002
Public Law 107-204 Sarbanes-Oxley Act of 2002
Public Law 108-311 Working Families Tax Relief Act of 2004
Public Law 108-357 American Jobs Creation Act of 2004
Public Law 108-447 Consolidated Appropriations Act of 2005
Public Law 109-58 Energy Policy Act of 2005
Public Law 109-97 Agricultural, Rural Development, Food and Drug Administration, and Related Agencies and Appropriations Act 2006
Public Law 109-222 Tax Increase Prevention and Reconciliation Act of 2005
Public Law 109-432 Tax Relief and Health Care Act of 2006
Public Law 110-5 Revised Continuing Appropriations Act of 2007
Public Law 110-140 Energy Independence and Security Act of 2007

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7 U.S.C. 901, et seq.
7 U.S.C. 903
7 U.S.C. 913
7 U.S.C. 940c-1
7 CFR 1714.8
29 U.S.C. 45(e)(11)
30 U.S.C. 241
15 U.S.C. 825s
16 U.S.C. 8381
26 U.S.C. 40A
26 U.S.C. 45H
2 U.S.C. 661a

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