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Report to the Chairman, Committee on Environment and Public Works, U.S. Senate

October 2011

TENNESSEE VALLEY AUTHORITY

Full Consideration of Energy Efficiency and Better Capital Expenditures Planning Are Needed

GAO-12-107

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Highlights

Highlights of GAO-12-107, a report to the Chairman, Committee on Environment and Public Works, U.S. Senate

Why GAO Did This Study

The Tennessee Valley Authority (TVA), the nation's largest public power provider, is a self-financing, federal electric utility with annual revenues of about $11 billion. TVA has financed large capital investments mostly by issuing debt and is subject to a $30 billion debt ceiling imposed by the TVA Act. TVA is governed by a 9-member Board. Within an affirmation requirement for the TVA Board, the TVA Act recognizes that TVA's broad missions and objectives include being a national leader in technological innovation, low-cost power, and environmental stewardship. GAO was asked to examine (1) how TVA plans to meet future demand for electricity and how TVA's resource planning and forecasts compare to those from other sources, (2) TVA's efforts to use energy efficiency to meet demand for electricity, and (3) TVA's financial condition and how it affects TVA's ability to meet its operational and financial goals. GAO analyzed data from TVA and third parties, reviewed agency documents, and interviewed federal and state officials and industry stakeholders.

What GAO Recommends

GAO recommends that TVA (1) use information from the energy efficiency study it commissioned to inform its future resource planning process and (2) develop a written capital expenditure plan that includes the full costs of the assets TVA plans to acquire and the sources of funding for acquiring those assets. TVA agreed with GAO's first recommendation and generally agreed with the second recommendation.

View GAO-12-107 or key components.
For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov, or Susan Ragland at (202) 512-9095 or raglands@gao.gov.

What GAO Found

According to its 2010 power supply plan, by 2029 TVA plans to meet electricity demand primarily by expanding natural gas-fired generating capacity, adding three nuclear reactors, and expanding energy efficiency programs. TVA also plans to retire some coal-fired capacity. These plans are informed by TVA's resource planning forecasts, which GAO determined were largely in line with plans and forecasts for the southeastern United States from other sources. For example, TVA forecasts that peak demand will grow at an average annual rate of about 1 percent for about the next 20 years, which is within the range of long-term forecasts for the Southeast from other sources, including the Department of Energy and a GAO nonprobability sample of five investor-owned utilities. TVA also plans to increase its generating capacity and total electricity generation by about 1 percent per year on average, both of which are within the range of plans and forecasts from other sources.

While TVA plans to expand its energy efficiency efforts to meet future demand for electricity, TVA may not be fully considering this alternative. For example, TVA's plans may not reflect the full energy efficiency potential of its service area, since it has not yet completed a study of that potential. As a result, TVA cannot be sure that its current resource plans reflect the full scope and possible extent of energy efficiency programs or that the plans are realistic. In March 2011, TVA commissioned a study on the energy efficiency potential of its service area, which is scheduled to be completed by October 2011. In addition, TVA's use of energy efficiency is constrained by several factors, including TVA's planning approach, which did not allow for potentially more cost-effective levels of energy efficiency in its planning model. In addition, TVA is not subject to certain key mandates and incentives that apply to some other utilities, such as the requirement in California for utilities to consider energy efficiency before other resources.

TVA's financial condition may hamper its ability to fund capital improvements. As of September 30, 2010, TVA's statutory debt was $23.6 billion, and TVA plans to spend almost $10 billion by fiscal year 2013 for various capital investment projects. Given the significant delays and cost overruns that TVA has historically experienced, these projects could potentially face similar issues. In addition, under a settlement with the Environmental Protection Agency, TVA agreed to invest $3 billion to $5 billion in the next 10 years on new and upgraded pollution controls on existing power plants. TVA also anticipates increases in operating costs. All of these factors could reduce the available funds TVA could use for its planned capital investments. TVA's financial condition leaves it with difficult decisions to make in order to meet electricity demand while keeping its debt within the statutory limit. TVA does not have a formal capital expenditure management plan that identifies assets to be acquired, their costs, and funding sources. The lack of such a plan may impede TVA's long range financial planning.

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Abbreviations

EIA	Energy Information Administration
EPA	Environmental Protection Agency
ESC	East South Central
GWh	gigawatt-hour
MW	megawatt
MWh	megawatt-hour
RPS	renewable portfolio standards
SERC	Southeastern Electric Reliability Council
TVA	Tennessee Valley Authority
TWh	terawatt-hour

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Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

October 31, 2011

The Honorable Barbara Boxer
Chairman
Committee on Environment and Public Works
United States Senate

Dear Madam Chairman:

The Tennessee Valley Authority (TVA) is a unique, self-financing, federally owned electric utility that provides electric power in a seven-state area in the southeastern United States. With more than nine million customers, a generating capacity of more than 34,000 megawatts (MW),[1] and annual electricity revenues of about $11 billion, TVA is the largest publicly owned utility in the United States. The electric utility industry is among the most capital-intensive industries in the world and utilities often must plan years in advance to build generating capacity to meet future demand. For example, a nuclear power plant with a single 1,100 MW reactor that could provide electricity to more than 600,000 homes can cost billions of dollars and require long lead times to obtain regulatory approval, perform engineering studies, and build the necessary infrastructure, among other things. TVA has primarily financed large capital investments, such as the construction of nuclear power plants, by issuing debt in the form of bonds. TVA is subject to a statutorily-imposed $30 billion debt ceiling imposed by the TVA Act of 1933, as amended,[2] and as of September 30, 2010, had about $23.6 billion in statutory debt and about $2.2 billion in alternative financial arrangements.[3] TVA's only

[1]Generating capacity, measured in kilowatts or MW, is the maximum capability of a power plant to produce electricity. TVA uses its generating capacity to produce electricity, measured in megawatt-hours (MWh).

[2]16 U.S.C. § 831n-4(a).

[3]Alternative financial arrangements include energy prepayments from customers and lease-leasebacks. Lease-leasebacks involve long-term leasing of power generators to private investors, and TVA retains legal title to the assets.

other source of funds for capital investments is its revenue from operations.[4]

TVA currently faces a number of financial challenges associated with environmental cleanup or protection. For example, in April 2011, TVA settled with the Environmental Protection Agency (EPA), agreeing to invest $3 billion to $5 billion in the next 10 years on new and upgraded pollution controls on existing power plants, and according to the settlement, plans to invest another $350 million to reduce pollution, primarily through energy efficiency projects. TVA has also incurred more than $1 billion in cleanup costs at the site of a large coal ash spill that occurred in December 2008 at TVA's Kingston, Tennessee, coal-fired plant.[5]

You asked us to review aspects of TVA's resource planning activities and financial condition, emphasizing TVA's existing resource planning process in the context of its debts and financial obligations as TVA seeks to make long-term energy investments. Our objectives were to examine (1) how TVA plans to meet future demand for electricity and how TVA's resource planning and forecasts compare to plans and forecasts from other sources, (2) TVA's efforts to use energy efficiency to meet demand for electricity, and (3) TVA's financial condition and how it affects TVA's ability to meets its operational and financial goals.

To address our first objective, we collected and reviewed pertinent TVA forecasts supporting TVA's most recent power supply plan, characterized TVA's electricity generation portfolio, and analyzed aspects of its electricity operations and plans to meet projected electricity demand. We evaluated TVA's assumptions and variables for some of the underlying determinants of its power supply plan, such as capital costs of electricity generation alternatives, fuel costs, emissions-related costs, and costs of energy efficiency programs. In addition, we interviewed TVA officials familiar with the agency's resource planning process. We compared TVA's forecasts with forecasts from other sources, including the

[4]Revenue from operations represents cash received from customers, primarily from the sale of power. Revenue from operations less cash paid for operating expenditures (or expenses) is net income. Net income is available for capital investments, the repayment of debt, and other investing and financing activities.

[5]Coal ash consists of the unburned residue and by-products, such as gypsum, remaining after coal combustion.

Department of Energy's Energy Information Administration (EIA) and nongovernmental sources, such as IHS Global Insight.[6] We also compared TVA's forecasts and plans with those of five investor-owned utilities operating in the southeastern United States, which we selected using a nonprobability sample.[7] We assessed the reliability of forecasts received from TVA, regional and national electric utilities, and other sources such as IHS Global Insight by interviewing knowledgeable individuals and by evaluating the forecasts for consistency with one another. We judged these forecasts to be reliable for the purposes of comparing TVA's forecasts with a variety of relevant benchmarks.

To address our second objective, we reviewed TVA's most recent power supply plan, historical data from EIA, and TVA's strategic planning documents, and interviewed TVA officials regarding TVA's energy efficiency and renewable energy resources, policies, and goals. In addition, we compared TVA's energy efficiency and renewable energy programs and efforts to the sample of five southeastern investor-owned utilities chosen for the first objective, as well as a sixth regional utility, Georgia Power, because it also had sufficient data for comparisons. We also compared TVA's programs and efforts to a nonprobability sample of five additional utilities that we identified as national leaders in energy efficiency to provide illustrative information. We identified these utilities based on EIA data on energy efficiency program expenditures and energy saved through these programs and by consulting with industry experts and reviewing industry reports. These five leading utilities were Austin Energy, Connecticut Power and Light, Northern States Power Company (Xcel Energy–Minnesota), Pacific Gas and Electric Company, and Southern California Edison. In addition, we interviewed officials from public service commissions, power associations, and energy sector associations to gather information on energy efficiency and renewable energy programs incentives, disincentives, and implementation challenges.

[6]IHS Global Insight provides comprehensive economic and financial information on countries, regions and industries.

[7]A nonprobability sample cannot be generalized to all utilities but provides illustrative information about the utilities we reviewed, which operate in the same geographic region of the United States as TVA.

To address our third objective, we examined TVA's strategic planning and budget documents, as well as independently audited TVA financial information from the Securities and Exchange Commission. We also interviewed TVA officials to discuss TVA's debt levels. We compared TVA's financial condition and activities to those of the five southeastern investor-owned utilities from the nonprobability sample, which are viewed as having a comparable financial credit rating and are geographically similar. For all three objectives, as applicable, we assessed the reliability of historical data received from TVA by interviewing individuals familiar with the processing and maintenance of the data; we judged these data reliable for the purpose of comparing TVA's forecasts of key variables to historical changes in the same variables.

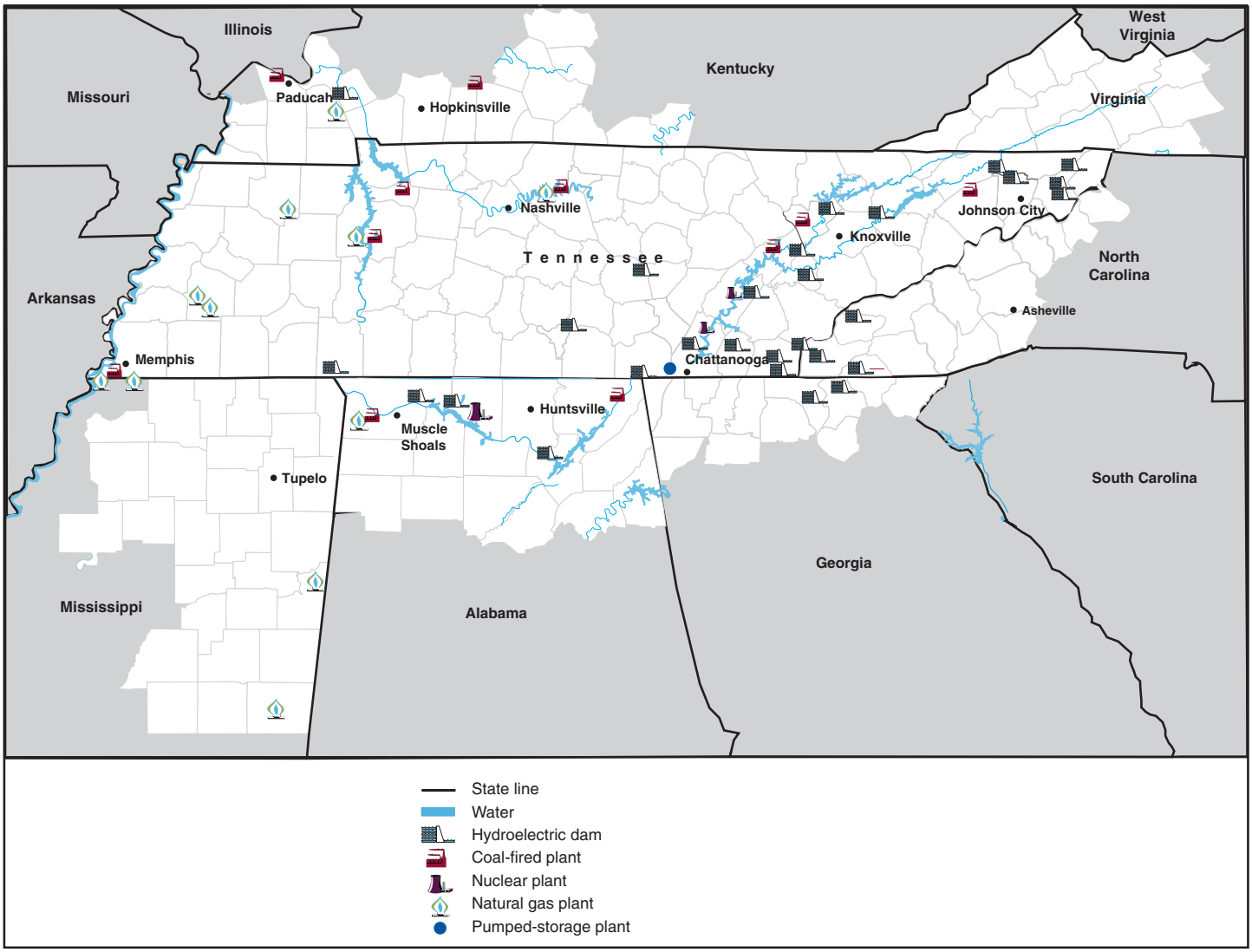
We conducted this performance audit from November 2009 through October 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. For more details on our scope and methodology, see appendix I.

Background

Established by the TVA Act of 1933 as part of President Franklin D. Roosevelt's New Deal, TVA's mission is to supply affordable, reliable power; support a thriving river system; and stimulate sustainable economic development in the public interest. In addition to generating and transmitting power, TVA also manages the nation's fifth-largest river system to minimize flood risk, maintain navigation, provide recreational opportunities, and protect water quality.

TVA's power service area covers about 80,000 square miles in the southeastern United States, an area that includes almost all of Tennessee and parts of Mississippi, Kentucky, Alabama, Georgia, North Carolina, and Virginia (see fig. 1) and has a total population of more than nine million people.

Figure 1: TVA Service Area and Key Electricity Generating Facilities



Sources: GAO analysis of TVA information and data; MapInfo (map).

In fiscal year 2010, TVA sold more than 173 million megawatt-hours (MWh) of electricity to customers. To meet this demand for electricity, TVA generates electricity at 11 coal-fired plants, 11 natural gas-fired plants,[8] 3 nuclear plants, and a hydroelectric system that includes 29 hydroelectric dams and 1 pumped storage facility (see fig. 1).[9] In fiscal year 2010, TVA's coal-fired plants produced about 42 percent of TVA's power, nuclear plants about 30 percent, the hydroelectric system about 8 percent, natural gas-fired plants about 3 percent, and nonhydropower renewables of less than 1 percent. TVA also purchased about 16 percent of its power needs from other suppliers. TVA owns and operates one of the largest electric transmission systems in North America.

Under the TVA Act, as amended, TVA has not been subject to many of the regulatory oversight requirements that commercial utilities must satisfy.[10] Additionally, TVA is exempt from paying federal and state taxes,[11] and can borrow funds for investment in its power system at very competitive interest rates as a result of its triple-A credit rating. This rating is based on TVA's credit strengths: its ownership by the federal government, the TVA Board's regulatory responsibility and statutory rate setting mechanisms, and TVA's protected service territory.[12]

Unlike many utilities, TVA charges rates for its electric power and its power resource decisions that are not subject to review and approval by state public utility commissions. However, in setting TVA's rates, TVA's

[8]The natural gas-fired plants include five combustion turbine plants, four combustion turbine plants located immediately adjacent to coal generation facilities, and two combined cycle plants, which use waste heat to generate additional electricity.

[9]A pumped storage plant uses two reservoirs, with one located at a higher elevation than the other. During periods of low demand for electricity, such as nights and weekends, energy is stored by reversing the turbines and pumping water from the lower to the upper reservoir. During periods of high demand, the stored water can be released to turn the turbines and generate electricity as it flows back into the lower reservoir.

[10]As an electric utility, TVA is subject to certain aspects of Federal Energy Regulatory Commission jurisdiction, as well as to other regulatory bodies and agencies including the Nuclear Regulatory Commission and EPA.

[11]While TVA does not pay federal and state taxes, it does make payments-in-lieu-of-taxes to state and local governments. These totaled $457 million in fiscal year 2010.

[12]The bonds and notes TVA issues do not constitute obligations of, and are not guaranteed by, the U.S. government.

Board must comply with the primary objectives of the TVA Act, including the objective that power shall be sold at rates as low as are feasible.[13]

All authority to run and operate TVA is vested in TVA's nine-member Board of Directors, including the sole authority to set wholesale electric power rates and approve the retail rates charged by TVA's distributors. Each board member is nominated by the President of the United States and confirmed by the Senate. Under the TVA Act, in order to be eligible for appointment as a member of TVA's Board of Directors, an individual must, among other things, affirm support for the objectives and missions of the TVA, including being a national leader in technological innovation, low-cost power, and environmental stewardship.[14]

Goals and Objectives, Resource Planning, and Forecasting

The TVA Act provides that the Board shall establish the broad goals, objectives, and policies of the Corporation that are appropriate to carry out the Act; develop long-range plans to guide the TVA in achieving its goals, objectives, and policies; and ensure that those goals, objectives, and policies are achieved.[15] Within an affirmation requirement for the Board, the TVA Act recognizes that TVA's broad missions and objectives include being a national leader in technological innovation, low-cost power, and environmental stewardship. In particular, eligibility for membership on the TVA Board requires, among other things, that potential members "affirm support for the objectives and missions of [TVA], including being a national leader in" these three areas.[16] The Act lays out the general duties of the board. These duties include that the Board shall: (a) "establish the broad goals, objectives, and policies of [TVA] that are appropriate to carry out this Act"; (b) "develop long-range

[13]TVA reports that its average electricity rates for residential customers in 2009—9.7 cents per kilowatt-hour—were lower than the national average among electric utilities of 11.6 cents per kilowatt-hour.

[14]Consolidated Appropriations Act, 2005, Pub. L. No. 108-447, § 601, 118 Stat. 2809, 2963 (2004), *codified at* 16 U.S.C. § 831a. Among other things, the act revised the composition, operation, and duties of the Board of Directors of the Tennessee Valley Authority. It expanded the Board's membership from 3 to 9 members and added new requirements for Board members, including the one cited.

[15]16 U.S.C. § 831a(g)(1).

[16]16 U.S.C. § 831a(b)(5).

plans to guide [TVA] in achieving [its] goals, objectives, and policies"; and (c) "ensure that those goals, objectives, and policies are achieved".[17]

TVA's latest strategic plan approved by the Board of Directors on May 31, 2007, which presents the agency's policy-level direction for the next decade, lists priorities for TVA's future focus that recognize the industry's changing landscape and a public policy emphasis on maintaining power reliability, providing competitive rates, renewable energy, low-emission generation technologies, and energy efficiency. The strategic plan also includes a number of strategic objectives and critical success factors, including partnering with distributors and directly serving customers to encourage conservation, promoting energy efficiency, and reducing peak demand; continuing to reduce the impacts of TVA's operations on the environment; and applying science and technological innovation to improve operational performance. In discussing these objectives, the plan states that TVA will strive to be a leader in energy-efficiency improvements and that renewables will play an increasingly important role in TVA's future generation. Moreover, in a July 21, 2009, resolution, the TVA Board stated that it is committed to being a "national leader in technological innovation, low cost power and environmental stewardship." In addition, in August 2010, the Board adopted a "renewed vision," stating that TVA will serve the people of the Tennessee Valley by being (1) the nation's leader in improving air quality, (2) the nation's leader in increased nuclear production, and (3) the Southeast's leader in increased energy efficiency. The renewed vision also states that TVA will be one of the nation's leading providers of low-cost and cleaner energy by 2020.[18]

TVA's strategic plan and renewed vision guide the development of other plans that are a part of TVA's overall power supply planning process. Of these, TVA's annual capacity expansion plan (or "power supply plan") is the primary plan TVA uses to provide support for its resource decisions.[19]

[17]16 U.S.C. §§ 831a(g)(1)(A)-(C).

[18]TVA defines "clean energy" production as energy production that has a low carbon emission rate, including energy from hydropower and nuclear plants, plus energy efficiency improvements.

[19]As required under the Energy Policy Act of 2005, TVA also conducts least-cost planning through an integrated resource planning (IRP) process. Many electric utilities use an IRP process to determine the most cost effective ways to prepare for the future power needs of their customers and develop an IRP, generally on a cycle of every 3 to 5 years. TVA completed its first IRP in 1995 and TVA's board accepted its new IRP in April 2011.

TVA uses the power supply plan to examine options for expanding its resources over the next 20 years in response to multiple scenarios. As part of its power supply plan, TVA develops forecasts of demand for electricity that help it make resource planning decisions, such as how much and what kind of capacity to build, or how much power to buy from other sources. Accurate forecasts can help utilities manage their costs and reliability by anticipating the need to invest in and maintain generating equipment that meets their customers' needs. If forecasts are not accurate, a utility could end up with more or less generating capacity than it needs to serve its customers reliably, or it could end up with a mix of generating capacity that is not cost effective. These outcomes can affect electricity rates as well as the utility's financial situation.

TVA employs a set of econometric and other models to forecast the demand for electricity in its service area for the next 20 or more years.[20] However, forecasting beyond a few years into the future involves great uncertainty. Utilities deal with forecast uncertainty by producing a range of forecasts based on factors believed to influence demand growth, such as population growth and economic growth in a utility's service area, and by maintaining excess generating resources, known as reserves.[21] Models help utilities choose the least-cost combinations of such generating resources to meet expected demand. Models are also used to project the amount of generation capacity that needs to be built to meet peak demand.[22]

Options to Meet Demand for Electricity

To meet demand, utilities can upgrade existing plants, construct new plants, purchase power from others, and provide incentive programs to customers to reduce and shift their demand for electricity, called energy efficiency programs. TVA delivers its energy efficiency programs to end-use customers through its 155 distributors, which are municipal utilities and electric cooperatives in TVA's service area. Energy efficiency

[20]This includes detailed models of the regional economy. In addition, TVA consults with industrial and commercial consumer groups to forecast demand.

[21]Other important factors are per capita income, employment, fuel prices, power purchase prices, energy efficiency program costs, and costs of emissions allowances.

[22]Peak demand is the maximum electrical demand on the system over a specific interval, such as a year, month, or day. Peak demand often occurs on hot summer days when, for example, heavy air conditioning use coincides with other electricity needs.

programs are intended to reduce the electricity used for a given task, and can reduce a system's overall requirements to provide electricity.[23]

Utilities can also use renewable energy resources such as wind, solar, biomass, and hydropower to meet electricity needs.[24] A number of states have emphasized renewable energy in recent years, especially through the implementation of state renewable portfolio standards (RPS). Designed to encourage the development of new renewable energy resources, an RPS requires utilities to provide a certain proportion of their electricity from renewable resources. As of June 2011, according to the Department of Energy, 29 states and the District of Columbia have mandatory RPSs, and 8 states have voluntary standards.[25]

TVA Debt and Financing Arrangements

Under the TVA Act, as amended, for its capital needs in excess of funds generated from operations, TVA is authorized to borrow by issuing bonds and notes; however, it is not authorized to issue equity securities such as stock. TVA's authority to issue bonds and notes is set by Congress and cannot exceed $30 billion outstanding at any given time, and its power programs are required to be self-financing through revenues from the sale of electricity.

We have previously reported on TVA's management of its high levels of debt, interest, and financing obligations.[26] TVA has historically recognized the need to reduce its debt and other financing obligations to increase its

[23]Unless otherwise noted, energy efficiency in this report includes energy efficiency and load management programs. Load management programs involve the use of incentives or price signals to lower energy demands during periods when demands are greatest or when system reliability is in jeopardy.

[24]Electricity can be generated from biomass, which is an organic, nonfossil material of biological origin.

[25]Of the states in TVA's service area, only North Carolina has a mandatory RPS. TVA officials told us that they have a policy supporting distributors that are subject to RPSs, and TVA has agreed to provide the renewable power to its four distributors in North Carolina to comply with that state's RPS.

[26]GAO, *Tennessee Valley Authority: Plans to Reduce Debt While Meeting Demand for Power*, GAO-06-810 (Washington, D.C.: Aug. 31, 2006); *Tennessee Valley Authority: Information on Lease-Leaseback and Other Financing Arrangements*, GAO-03-784 (Washington, D.C.: June 30, 2003); *Tennessee Valley Authority: Information on Benchmarking and Electricity Rates*, GAO-02-636 (Washington, D.C.: May 30, 2002); and *Tennessee Valley Authority: Debt Reduction Efforts and Potential Stranded Costs*, GAO-01-327 (Washington, D.C.: Feb. 28, 2001).

financial flexibility and meet competitive challenges, but has not always been successful in doing so. For example, in 1997, TVA issued a 10-year business plan that called for TVA to reduce its debt by half over a 10-year period to about $13.2 billion by increasing its electricity rates beginning in 1998, reducing certain expenses, and limiting capital expenditures; however, TVA was unable to meet its 1997 debt reduction goal because it used revenue to cover annual operating costs and had capital expenditures that were higher than expected. TVA officials explained that TVA had intended to meet demand by relying, in part, on purchased power agreements and merchant-provided power. However, according to these officials, some purchased power agreements failed due to default, and merchant-provided power was not readily available. They added that, as a result, TVA switched to an emphasis on constructing generating assets which, in turn, limited TVA's ability to meet its debt reduction goals.

In fiscal year 2000, to obtain lower financing costs, TVA began entering into alternative financial arrangements in the form of lease-leasebacks and energy prepayments.[27] In a June 2003 report, we stated that TVA's lease-leaseback arrangements involved the refinancing of 24 combustion turbine power generators.[28] TVA leased the power generators to private investors for 50 years and simultaneously leased them back for 20 years. Under these lease-leaseback arrangements, TVA received cash from private investors, but retains legal title to the assets. The investors receive lease payments from TVA and obtain certain tax benefits, some of which are passed on to TVA in the form of more favorable financing rates. TVA also implemented energy prepayments that allowed its customers to prepay for power in exchange for discounted rates in advance of the period in which it is provided.[29] In the 2003 report, we suggested that Congress may want to consider amending the TVA Act to clarify whether these arrangements should count toward the debt cap, since they have the same impact on TVA's financial condition and

[27]TVA does not count these alternative financial arrangements toward its statutory debt limit.

[28]GAO-03-784.

[29]For example, in fiscal year 2004, TVA received a $1.5 billion prepayment from Memphis Light, Gas & Water Division for a portion of its electricity needs through 2018.

competitive position as traditional debt financing, but no such amendment has been made to date.[30]

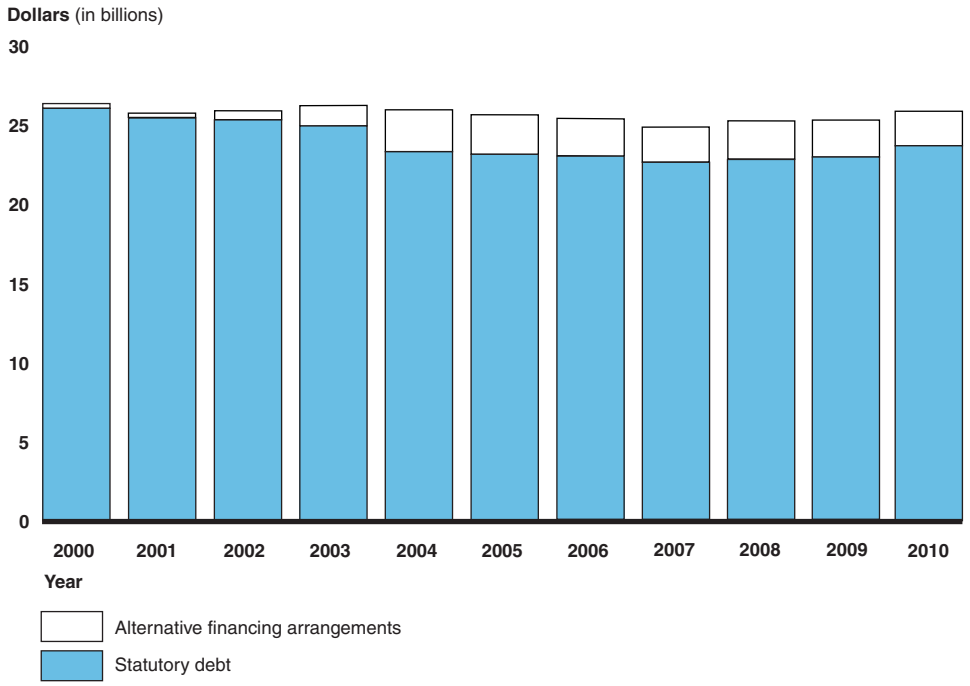
In 2004, with total financing obligations of almost $26 billion, TVA's board adopted a strategic plan for reducing debt that called for increasing revenue, controlling costs, and reducing the growth of capital expenditures. In 2006, TVA prepared a budget proposal that set a debt reduction goal of $7.1 billion, which included reducing its statutory debt by $6.7 billion and alternative financing obligations by $400 million. However, based on the direction of TVA's board and as reflected in its 2007 strategic plan, TVA shifted its focus from debt reduction to a broader focus on financial management based on a set of financial guiding principles.[31] TVA stated that this strategy was developed in response to the priorities of its Board of Directors; significant changes in the electric utility marketplace since the 2004 strategic plan; and the Energy Policy Act of 2005,[32] which places more emphasis on reliability, renewable energy, low-emission generation technologies, and energy efficiency and conservation. Since the adoption of these principles, TVA's statutory debt has surpassed the 2004 level, while total financial obligations have almost returned to 2004 levels. On September 30, 2010, TVA reported having $25.8 billion in financial obligations, including $23.6 billion in statutory debt and about $2.2 billion in alternative financing arrangements. While TVA's level of total financial obligations has fallen since fiscal year 2000 when it was almost $26.3 billion, the overall level of total financial obligations has remained fairly constant for the past 10 years, as shown in figure 2.

[30]Generally accepted accounting principles require that the lease-leaseback and energy prepayment arrangements used by TVA be classified as liabilities. In fiscal year 2004, the Office of Management and Budget began classifying lease-leaseback arrangements as debt. Moreover, according to TVA records, from 2003 through 2007, proposals in the President's budget would have counted all transactions that result in debt-like instruments that increase long-term liabilities towards TVA's statutory debt limit. That legislation was never enacted.

[31]These principles include, for example, retiring debt over the useful life of assets and issuing new debt for the acquisition of new assets.

[32]Pub. L. No. 109-58, 119 Stat. 594 (Aug. 8, 2005).

Figure 2: TVA Financial Obligations, Fiscal Years 2000 through 2010



Source: GAO analysis of TVA financial data.

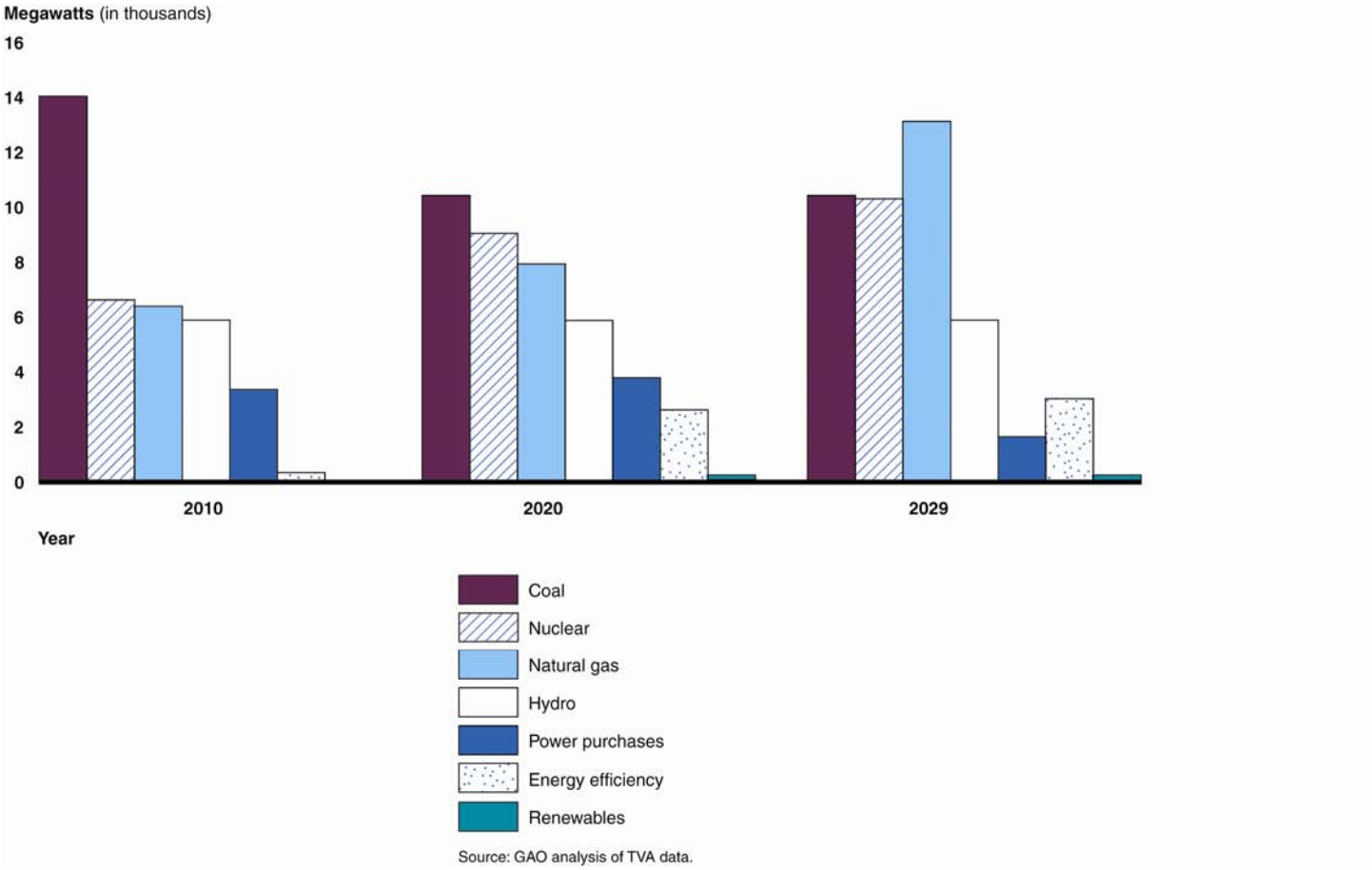
TVA's Plans Focus on Building Natural Gas and Nuclear Capacity, and Its Forecasts Are Largely in Line with Others

TVA plans to meet future electricity demand primarily by expanding natural gas-fired and nuclear-powered generating capacity, reducing the amount of coal-fired generating capacity, and expanding energy efficiency programs. These plans were informed by TVA's planning forecasts, which we determined were largely in line with forecasts from other sources for the Southeast.

Plans for Meeting Electricity Demand Focus on Building Natural Gas and Nuclear Plants

Our analysis of TVA's 2010 power supply plan indicates that TVA plans to change the mix of resources it will use to meet demand from 2010 through 2029, primarily by expanding natural gas-fired and nuclear-powered generating capacity (see fig. 3). TVA also plans expansions of energy efficiency programs.

Figure 3: TVA's Planned Capacity and Other Resources, 2010 through 2029



TVA's power supply plan describes three types of resources that TVA can use to meet its electricity demand from 2010 through 2029: its own generating capacity, power purchases, and energy efficiency. TVA's own generating capacity comprises power plants that use various sources of energy, including nuclear power, coal, hydropower, natural gas, and renewable energy sources. TVA's power purchases may include

contracted or spot purchases. Finally, by helping to reduce demand for electricity, energy efficiency programs can reduce TVA's need for either new generating capacity or power purchases.

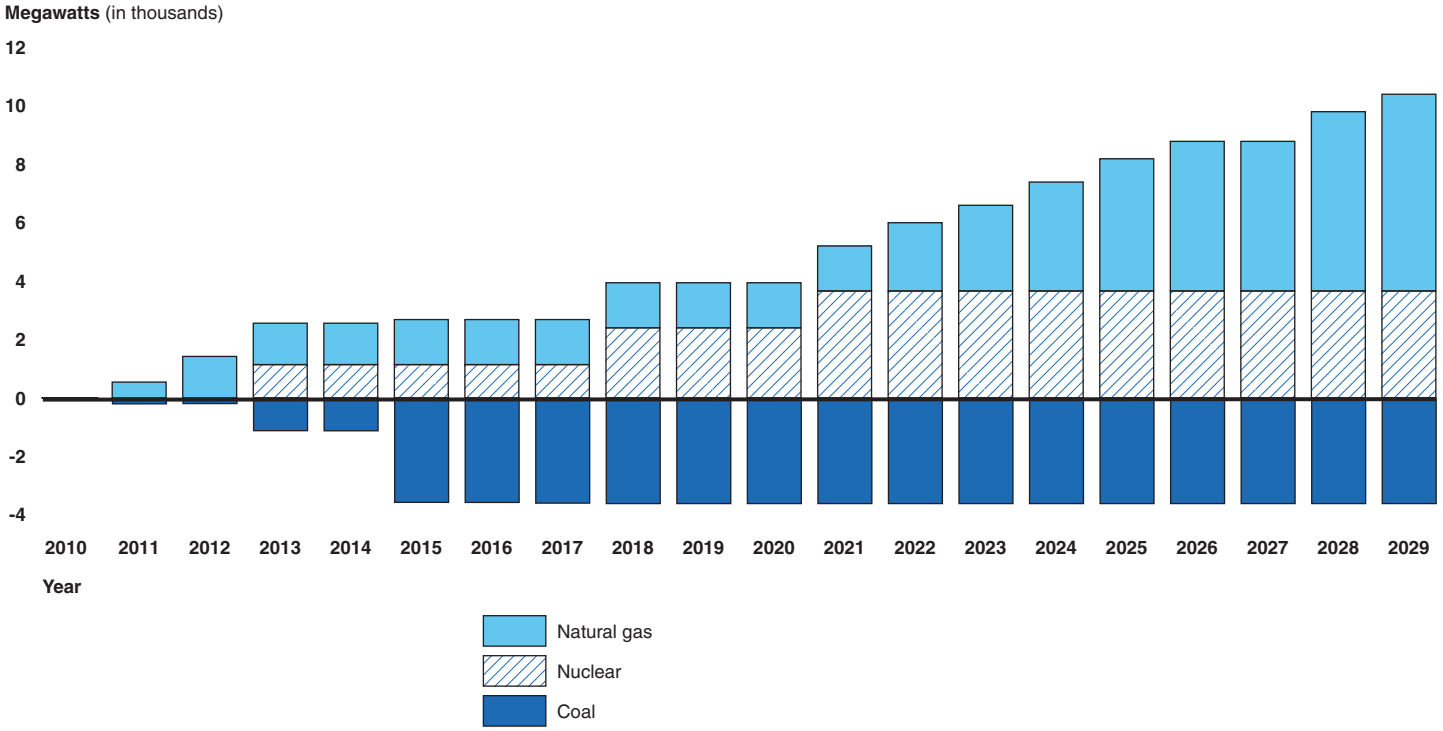
In its 2010 power supply plan,[33] TVA's total generating capacity would increase by a net of 6,627 MW from summer 2010 through summer 2029, reflecting reductions of 3,768 MW and 10,395 MW of new additions. These changes would affect the composition of TVA's total generating capacity: the planned reductions include 3,608 MW of coal-fired capacity to be retired,[34] while the planned new additions include 6,737 MW of natural gas-fired capacity and three nuclear reactors with a total capacity of 3,658 MW. These new additions include committed new additions, approved by TVA's Board of Directors, as well as uncommitted new additions, which the board has not yet approved. The committed projects would add 2,556 MW of capacity by summer 2013, including 540 MW of natural gas-fired capacity at the Lagoon Creek plant already completed in September 2010. The other committed projects include 878 MW of natural-gas fired capacity at the John Sevier power plant and 1,138 MW of nuclear capacity at the Watts Bar Unit Two power plant. Uncommitted new additions account for 7,839 MW of new additions, split between 5,319 MW of natural-gas fired capacity and 2,520 MW of nuclear capacity. Figure 4 depicts TVA's planned retirements of coal-fired capacity, and all new additions of natural gas-fired and nuclear capacity from 2010 through 2029.[35]

[33]TVA's power supply plan provides information to TVA's Board of Directors, which has final authority for approval of TVA's budget, including investments in capacity additions. To date, the board has approved all new planned additions through 2013, but not beyond. Thus, the plans for any additions beyond 2013 are subject to greater uncertainty. Nevertheless, according to TVA officials, the power supply plan represents TVA's preferred options for meeting forecasted demand in the long-term.

[34]Modifications to other types of generating capacity existing in 2010 account for the remaining 160 MW of reductions.

[35]TVA's power supply plan shows new additions of only natural gas-fired and nuclear capacity, and planned retirements of coal-capacity account for most of TVA's planned reductions in capacity. Changes in resources other than TVA's own generating capacity, such as power purchases and energy efficiency, are not presented in figure 4 but are discussed in this section.

Figure 4: TVA's Cumulative New Additions and Retirements by Fuel Type, 2010 through 2029



Source: GAO analysis of TVA data.

According to TVA officials and documents, TVA plans to complete construction of three nuclear reactors, or units, at two nuclear plants by summer 2021. The initial construction on these units began about four decades ago but was never completed.[36] TVA resumed construction on the Unit Two reactor of the Watts Bar nuclear plant, in eastern Tennessee, in 2007, and it is scheduled for completion by summer 2013.[37] At the Bellefonte nuclear plant site, in northeastern Alabama, TVA is considering completing Unit One by 2018 and Unit Two by 2021. According to our analysis of TVA's plans, in the summer of 2029, TVA's total nuclear capacity would account for about 23 percent of TVA's total

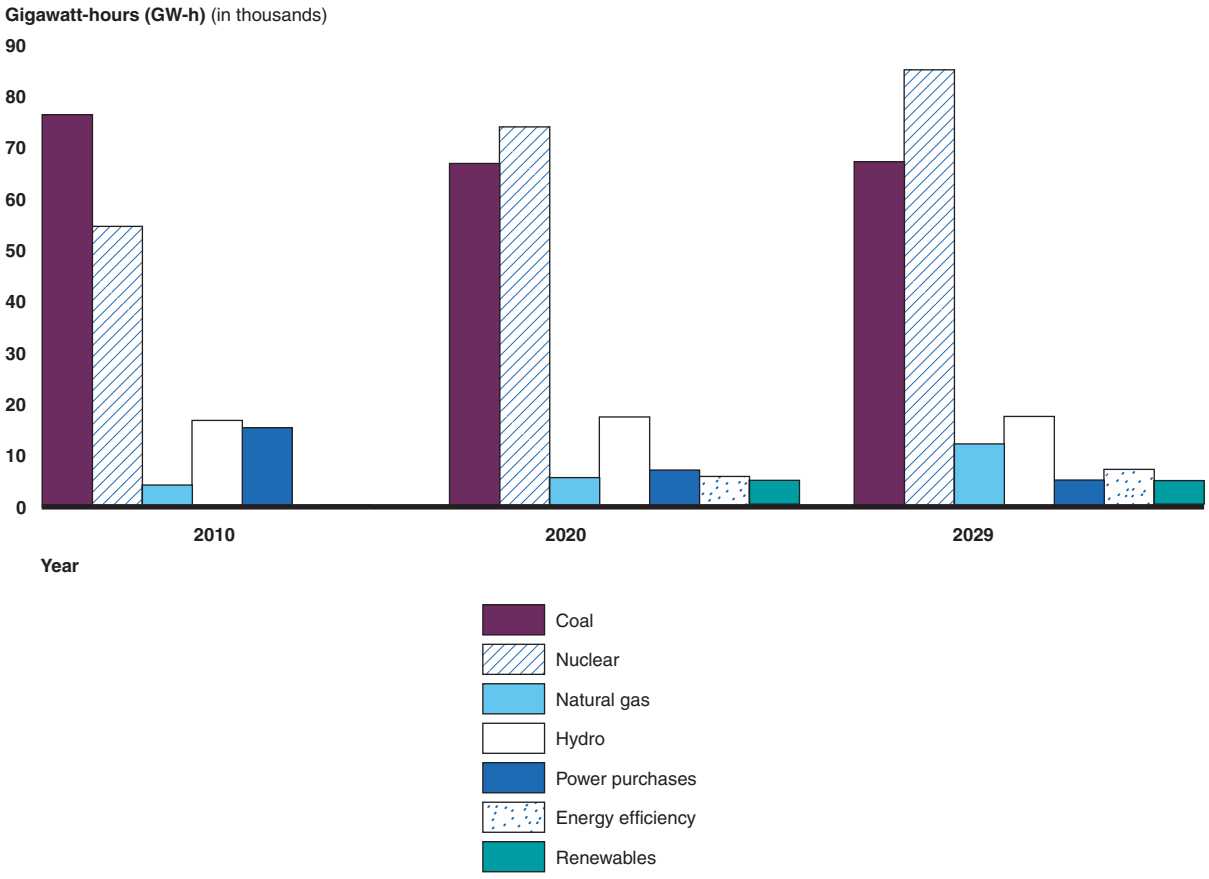
[36]Initial construction on the Watts Bar and Bellefonte nuclear plants began in 1972 and 1974, respectively.

[37]Watts Bar Unit One was completed in 1996 and is currently operating.

resources but would produce about 43 percent of TVA's electric power from all sources, because TVA's nuclear power plants are baseload plants that would operate almost continuously. In contrast, our analysis shows that TVA's natural gas plants would account for about 29 percent of TVA's total resources in summer 2029 but produce about 6 percent of TVA's power in fiscal year 2029, since these plants are expected to operate primarily during periods of peak demand.[38] The ultimate effect of these changes will be to increase the share of electricity produced by nuclear power and natural gas and decrease the share of electricity produced by coal and other sources, as shown in figure 5.

[38]The figure of 6 percent represents power generated from TVA's own natural gas-fired plants as a share of power obtained from all sources, including electricity purchases. When purchases of electricity from natural gas-fired plants are added to power generated from TVA's own natural gas-fired plants, the share of generation from natural gas rises to 8.8 percent.

Figure 5: TVA's Plans to Generate Electricity by Source, Fiscal Years 2010 through 2029



Source: GAO analysis of TVA data.

TVA officials provided several reasons for their plans to change the mix of generating resources:

- *Anticipated environmental regulations*. As indicated in TVA's long-term resource plan and according to TVA officials, TVA plans to retire about 26 percent of its coal generating capacity as a strategic response to potential increases in the stringency of environmental standards, such as those related to sulfur dioxide, nitrogen oxides, and hazardous air pollutants, as well as greenhouse gas emissions pricing, which could make TVA's older coal-fired power plants less economically viable. Burning natural gas produces lower emissions per unit of electricity than burning coal, and nuclear fission emits no carbon dioxide directly, so these resources would not be as strongly

affected by this kind of environmental risk, making them relatively attractive investments.[39]

- *Construction of nuclear plants under way*. TVA owns three partially completed reactors at two of its nuclear plants. TVA officials said that these could be economically viable alternatives to other resources, in part because completing them would cost less than building entirely new plants.

- *Limited opportunities to develop renewable energy*. As of 2009, about 0.5 percent of TVA's total sales came from renewable resources other than hydropower.[40] At that time, less than 0.1 percent of TVA's total generating capacity—about 6 MW—was from TVA-owned nonhydropower renewable resources in its service area. TVA plans to add new renewable energy resources, largely by increasing its purchases of wind energy. In 2009 and 2010, TVA entered into numerous 20-year contracts to purchase up to 1,625 MW of wind power from projects in the Midwest. When fully activated in 2012, this would represent nearly 75 percent of TVA's renewable energy portfolio.[41] TVA officials said that their region has relatively poor wind resources and that solar intensity is less than in other parts of the country. They added that their renewable energy purchases from suppliers outside their service area are costly because they require transmission over longer distances, and the existing capacity of transmission infrastructure limits the amount of power purchased from distant locations.

[39]Carbon dioxide and other greenhouse gases emitted as by-products of human activity can affect Earth's climate by trapping heat that would otherwise escape the atmosphere.

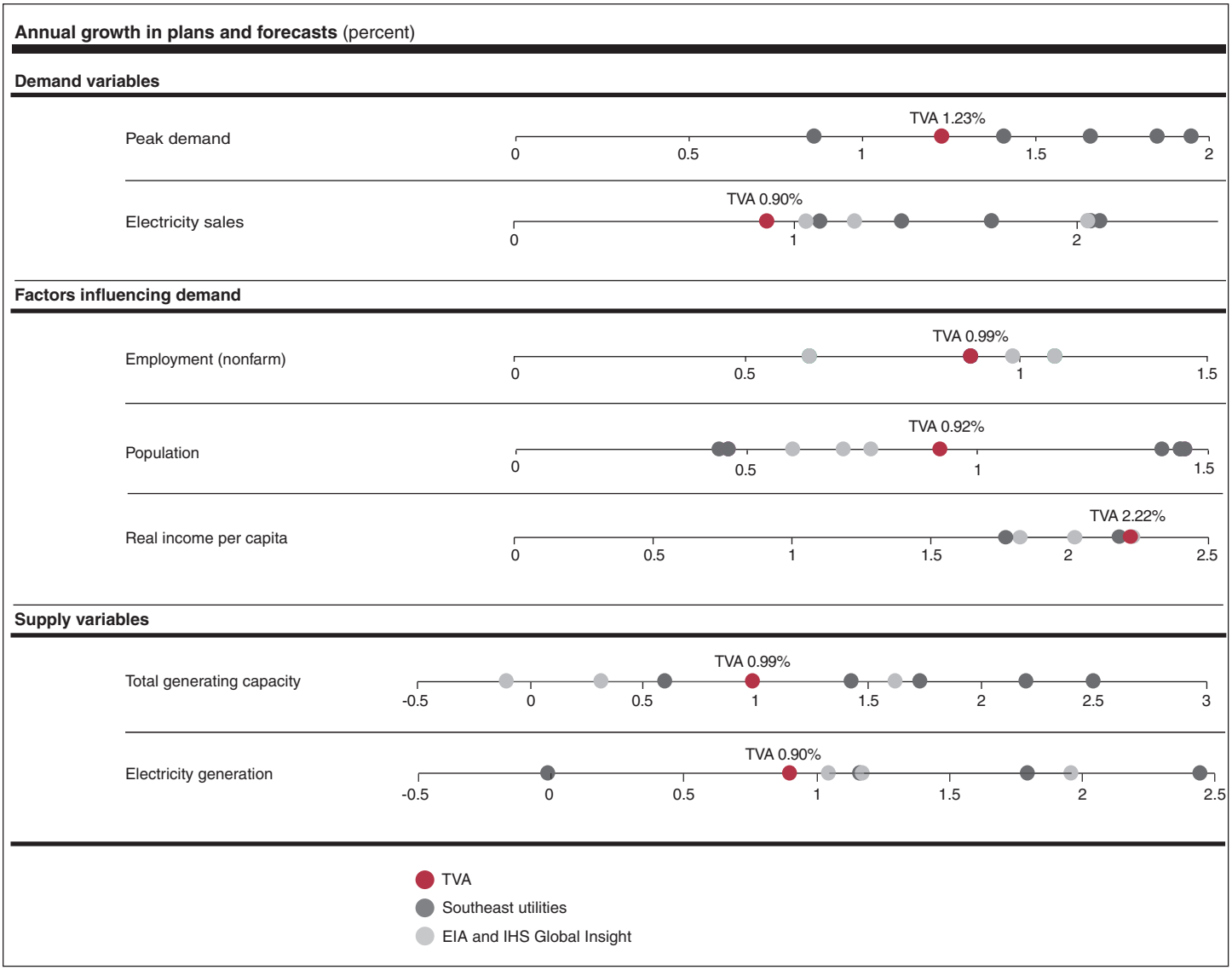
[40]This includes 1 small wind farm, 14 small solar sites, and projects to add biomass and burn methane from waste-water at fossil fuel plants. TVA also purchased power from nonhydropower renewable energy resources inside its service area, amounting to about 0.1 percent of capacity, or 35 MW.

[41]TVA's renewable energy portfolio also includes 403 MW of hydropower upgrades and improvements completed since 2000.

TVA's Resource Planning and Forecasts Are Largely in Line with Plans and Forecasts for the Southeast from Other Sources

The average annual rates of growth in TVA's long-term plans and forecasts are largely within the range of the average annual rates of growth in long-term plans and forecasts for the Southeast from other sources. Figure 6 shows how TVA's long-term plans and forecasts in its reference case—which represents base assumptions for capacity expansion and related financing—compare to those of other sources. The figure shows measures of demand, supply, and factors influencing demand, derived from TVA's forecasts and plans, compared with similar measures from forecasts and plans of investor-owned utilities in the Southeast and forecasts for the region from the EIA and IHS Global Insight.

Figure 6: Average Annual Growth Rates in Long-term Plans and Forecasts for the Southeast from TVA and Other Sources



Sources: GAO analysis of data from TVA, Southeast utilities, EIA, and IHS Global Insight.

Note: Appendix II presents information about each long-term plan or forecast represented, including the average annual rate of growth, the year in which the forecast or plan was released, the time span covered, and the region. Real income per capita refers to income per person that has been adjusted for inflation.

TVA expects its peak demand will grow at an annual rate of about 1.2 percent, on average, from 2010 through 2030. This is within the range of the average annual growth rates in forecasts of peak demand from the five southeastern utilities in our nonprobability sample. The annual growth in TVA's projected electricity sales of about 0.9 percent is slightly below the bottom of the range of annual growth rates in projections from the five southeastern utilities, EIA, and IHS Global Insight. An important factor affecting TVA's projected sales is that TVA expects that one of its largest single customers, the United States Enrichment Corporation, will reduce its demand for electricity from TVA, from about 8 percent of TVA's sales in fiscal year 2010 to less than 1 percent of TVA's sales in fiscal year 2015.[42]

The average annual rates of growth in TVA's forecasts of factors that can influence demand, such as population, employment, and real per capita income, are also within the range of estimates from the other southeastern utilities in our sample, EIA, and IHS Global Insight. TVA forecasts that the population in its service area will grow by about 0.9 percent, employment will grow by about 1 percent, and real per capita income will grow by about 2.2 percent annually from 2010 through 2030.

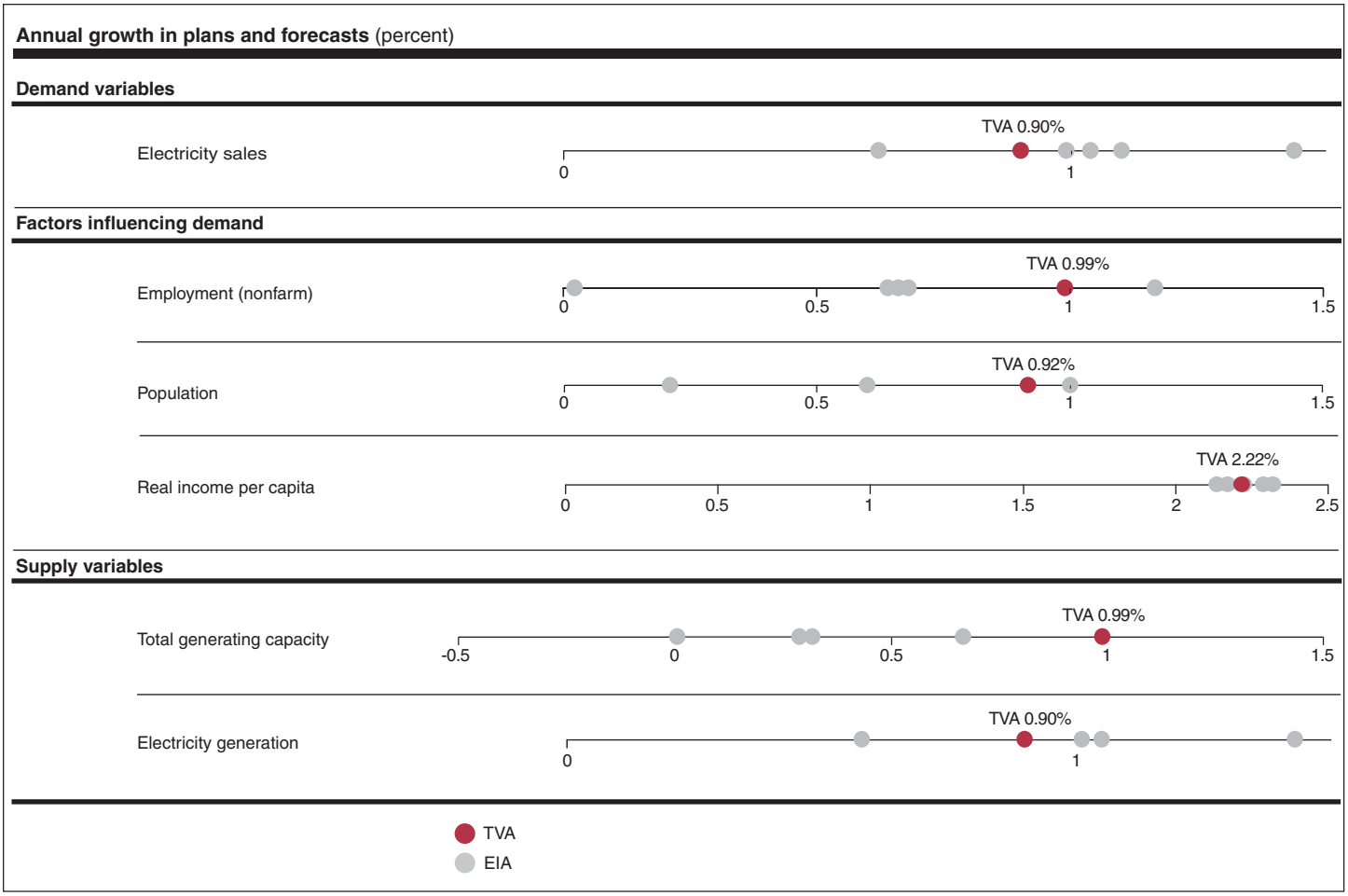
To help meet its forecasted demand for electricity, TVA plans to increase its total generating capacity and produce more electricity. The average annual rates of growth in TVA's plans for capacity and electricity generation are within the range of average annual rates of growth in other plans and forecasts for the Southeast from other utilities, EIA, and IHS Global Insight. TVA plans to increase its total generating capacity at an annual rate of about 1 percent and its total electricity generation at an annual rate of about 0.9 percent, on average.

Growth in TVA's long-term plans and forecasts also tends to fall within the range of growth rates in forecasts of different cases modeled by EIA in its 2010 Annual Energy Outlook, as figure 7 shows.[43]

[42]The United States Enrichment Corporation is a leading supplier of enriched uranium fuel for commercial nuclear power plants.

[43]For its 2010 Annual Energy Outlook, EIA modeled five alternative cases that together describe a range of possible outcomes reflecting different assumptions about the future. EIA's cases include a reference case, a high economic growth case, a low economic growth case, a high oil price case, and a low oil price case. Appendix II shows that, for some variables, the annual growth rate is the same in more than one case.

Figure 7: Average Annual Growth Rates in Long-term Plans and Forecasts from TVA and Five Cases for the Southeast Modeled in EIA's 2010 Annual Energy Outlook



Sources: GAO analysis of data from TVA and EIA.

Note: Appendix II presents information about each long-term plan or forecast represented, including the average annual rate of growth, the year in which the forecast of plan was released, the time span covered, and the region. Real income per capita refers to income per person that has been adjusted for inflation.

Although Expanding Its Energy Efficiency Programs, TVA May Not Be Fully Considering This Resource

TVA plans to expand its energy efficiency efforts to meet future demand for electricity. However, as TVA has not used studies of the energy efficiency potential of its service area as the primary basis for its energy efficiency goal, it cannot be sure that its current plans reflect the full scope and possible extent of energy efficiency programs nor that its current plans are realistic. In addition, TVA's use of energy efficiency is constrained by several factors, including how TVA treats energy efficiency in its resource planning approach, and the fact that TVA is not subject to certain key mandates or incentives that apply to some other utilities.

TVA's Plans May Not Reflect the Full Energy Efficiency Potential of Its Service Area

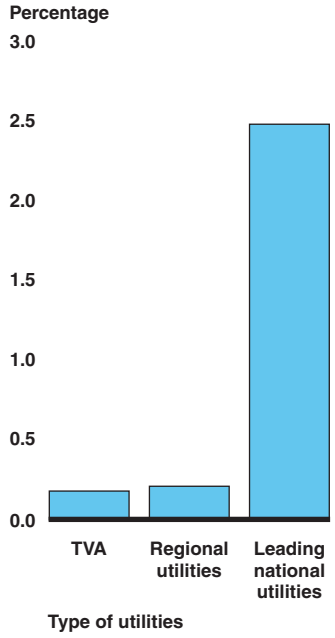
In August 2010, TVA announced in its renewed vision that it plans to become the leader in energy efficiency in the Southeast. To accomplish its vision, TVA established a goal of 3.5 percent cumulative energy savings in 2015 resulting from energy efficiency programs begun since 2010.[44] TVA selected this goal based on a study it commissioned to determine the level of savings necessary to become the Southeast's energy efficiency leader among electric utilities. TVA's Board of Directors approved $135 million in spending on energy efficiency programs in fiscal year 2011, but TVA officials told us that it will need to add $414 million more to future budgets to achieve its 3.5 percent energy efficiency goal in 2015. Although several experts said that TVA's projected level of savings is aggressive for utilities lacking significant energy efficiency experience, TVA officials said they considered the level of expected savings to be reasonable based on their views of the technical feasibility of planned efforts and the ability to work through TVA's distributors. Nonetheless, TVA did not use studies of energy efficiency potential in its service area as the primary basis for the goal. In March 2011, TVA signed a contract commissioning a third party to study the energy efficiency potential of TVA's service area, which is scheduled to be completed by October 2011. Until this study is completed, TVA cannot be sure that its goal reflects the full potential for cost-effective energy efficiency savings in its service area, nor can it be sure that its goal is realistic.[45]

[44]This goal represents cumulative energy savings achieved in 2015 from all programs developed between 2010 and 2015, relative to projected 2015 energy sales. Utility experts told us that this cumulative measure represents the sum of the incremental energy savings achieved in previous years.

[45]We did not review the scope or reasonableness of this study, or the extent to which it is expected to provide TVA information on the energy efficiency potential in its service area it requires for resource planning purposes.

Compared with leading national utilities we identified, TVA and other southeastern utilities have so far made smaller investments in energy efficiency. Industry experts consider the level of investment a leading factor in judging a utility's performance in energy efficiency. During the period from 2005 through 2009, TVA averaged about $17 million per year in spending on energy efficiency programs, or about 0.18 percent of its revenues, as shown in figure 8. The southeastern utilities we reviewed in our regional sample spent an average of 0.21 percent of revenues on energy efficiency programs during the same period. In contrast, as illustrated in figure 8, the five leading national utilities we identified spent an average of 2.5 percent of revenues on energy efficiency programs, about 14 times as much as TVA.

Figure 8: Average Annual Energy Efficiency Spending as a Percentage of Total Revenues, 2005 through 2009



Sources: GAO analysis of EIA and utility data.

Note: "Regional utilities" are investor-owned.

Studies by industry experts have indicated that the South Census region has the greatest potential for energy efficiency savings of any in the country.[46] Furthermore, a TVA official told us that the lack of investment in energy efficiency programs in TVA's past means that there is a large reservoir of attainable energy efficiency savings to be had in the future. For example, TVA has done relatively little to target lighting efficiency, an area in which some utilities have achieved as much as one-third of their total efficiency savings.

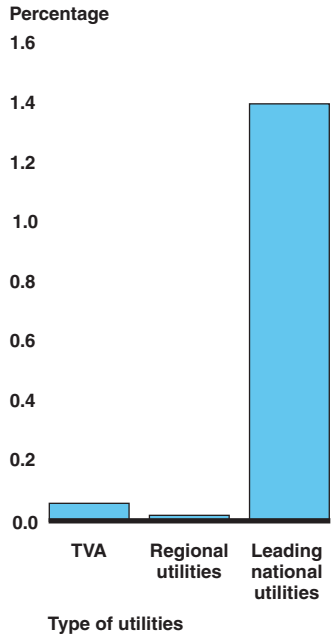
As a result of its smaller investments, TVA has realized less energy savings from energy efficiency programs than the savings achieved by leading utilities we examined. Energy that is saved through energy efficiency programs reduces the amount of electricity that a utility must generate itself or purchase from others. There are various ways to measure and compare energy savings from energy efficiency programs, but, according to industry experts, the most accepted way is to measure savings in a given year based on efforts implemented during that year, referred to as annual incremental savings.[47] While TVA officials told us that TVA has not established a goal for incremental energy savings, an energy efficiency expert we contacted said that TVA's goal of 3.5 percent cumulative energy savings in 2015 could translate into 1 percent incremental savings in that year. As shown in figure 9, from 2005 through 2009, the incremental energy savings of TVA's energy efficiency programs averaged 0.06 percent of retail energy sales.[48] As illustrated in figure 9, the sample of southeastern utilities we reviewed averaged about 0.02 percent, whereas leading national utilities we reviewed averaged 1.4 percent over this period, about 23 times as much as TVA.

[46]The South Census region comprises Alabama; Arkansas; Delaware; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; Washington D.C.; and West Virginia.

[47]Annual incremental savings are savings achieved in a given year from programs implemented that year and from new participants in existing programs. This does not capture energy savings achieved in programs developed in previous years by participants who joined in previous years.

[48]In this report, all TVA sales to distributors are included in our calculation of energy savings as a percentage of retail sales, since TVA delivers its energy efficiency programs to retail customers through its 155 local distributors, who purchase wholesale power from TVA.

Figure 9: Average Annual Incremental Energy Savings as a Percentage of Retail Energy Sales, 2005 through 2009



Sources: GAO analysis of EIA and utility data.

Note: "Regional utilities" are investor-owned.

TVA's Energy Efficiency Efforts Are Constrained by Several Factors

Several factors constrain TVA's energy efficiency efforts. Especially significant is that, as of 2010, TVA's planning process constrained the consideration of energy efficiency.

TVA's Planning Process May Limit Energy Efficiency Efforts

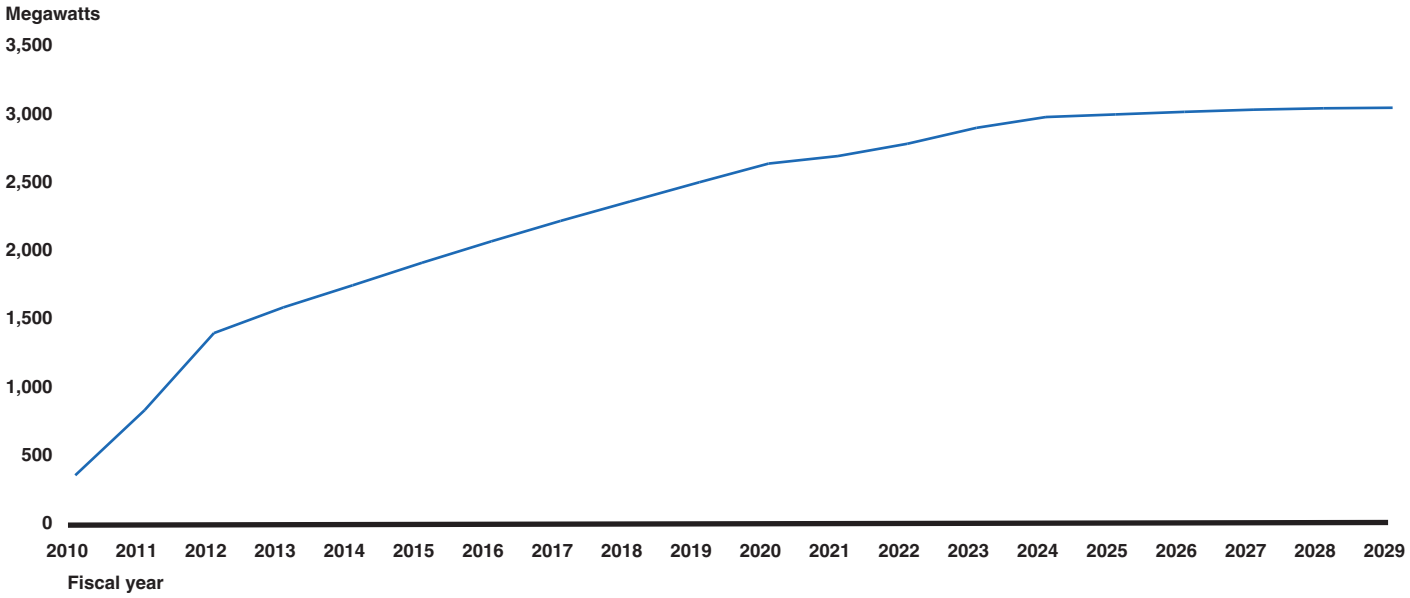
Several elements of the process TVA used to establish its 2010 power supply plan may have favored construction of new generating capacity over energy efficiency. First, according to TVA officials, TVA did not use its planning model to help identify the most cost-effective levels of energy efficiency. Rather, the officials told us that they chose the energy efficiency level based on what they judged was achievable at an "attractive" cost, and then TVA developed the remainder of its plan around these predetermined levels by letting its planning model identify the most cost-effective levels of nuclear, natural gas, power purchases,

and other resources.[49] Because of the predetermined levels, the model was not allowed to select from different levels of energy efficiency. As a result, TVA does not know whether the model would have identified other potentially more cost-effective levels of energy efficiency resources. This may be particularly problematic because TVA data indicate that it generally costs less to save a unit of electric power through energy efficiency programs than it does to generate a unit of electricity from a newly-built nuclear or natural gas-fired plant.

A second element that may favor new generating capacity is that TVA's assumptions regarding contributions from energy efficiency programs may have been too conservative in the long run. TVA's 2010 power supply plan shows leveling off of energy efficiency program contributions, especially after 2020 (see fig. 10). According to TVA officials, this leveling off is due to the assumption that energy efficiency technology will remain at existing levels and that there are finite opportunities for energy savings among TVA's customer base. However, TVA's assumption that energy efficiency technology will remain at existing levels is contrary to the historic trend of improvements in energy efficiency in the United States, as well as to future projections. For example, a study of Organization for Economic Co-operation and Development member countries indicates that overall improvement in energy efficiency in the United States averaged 1.5 percent annually between 1990 and 2006 and that it was driven by technological change. Experts expect technological advances to continue providing opportunities for energy efficiency gains into the future. For instance, advancements in the energy efficiency of windows and air conditioners allow home-owners to reduce their electricity usage. TVA officials said that they will review their assumptions affecting the potential impact of energy efficiency programs in future planning, as well as the results of the study TVA commissioned on the energy efficiency potential for TVA's service area, which is expected to be completed in October 2011.

[49]TVA officials told us that for its draft 2011 power supply plan, TVA intends to use a wider range of energy efficiency portfolios in its resource planning models to be more consistent with its corporate vision of being a Southeast leader in energy efficiency.

Figure 10: TVA's Expected Energy Efficiency Contributions, 2010 through 2029



Source: GAO analysis of TVA data.

A third element is TVA's method of accounting for the cost of energy efficiency programs, which may introduce bias against energy efficiency. TVA assigned the costs of energy efficiency programs to the years in which the investments are made, instead of spreading these costs over the years during which energy savings are realized.[50] This practice assumes that the majority of energy efficiency program costs must be recovered from ratepayers during the early years of a program's useful lifetime. While this treatment of energy efficiency programs is not unique to TVA, it may make energy efficiency appear less desirable than it would if costs were spread out over the projects' useful lives, according to electric utility planning experts and a Lawrence Berkeley National Laboratory study.[51]

[50]Many—perhaps the majority—of electric utilities in the United States use this practice, known as "expensing," for the costs of energy efficiency investments rather than spreading those costs out over the project lifetimes, known as "amortizing."

[51]Peter Cappers and Charles Goldman, Ernest Orlando Lawrence Berkeley National Laboratory, *Financial Impact of Energy Efficiency under a Federal Renewable Electricity Standard: Case Study of a Kansas "super-utility"* (November 2009).

Other Factors Limit TVA's Energy Efficiency Efforts

TVA is not subject to certain significant mandates and incentives that other utilities have to encourage energy efficiency. For example, TVA lacks mandates to treat energy efficiency as a top-priority resource, and it has chosen not to prioritize energy efficiency over other cost-effective resources.[52] In addition, some utilities are subject to an Energy Efficiency Resource Standard, which requires a minimum level of energy efficiency savings, and some states have established energy efficiency savings goals for utilities and provided financial incentives to these utilities based on the percentage of savings achieved. Additional examples of mandates and incentives and other policies that encourage energy efficiency are shown in appendix III.

According to TVA officials, other factors challenge TVA's ability to achieve its energy efficiency plans. Specifically:

- *Numerous diverse distributors*. TVA's distributors purchase power from TVA and sell it to retail customers. According to TVA officials, because distributors' abilities to implement energy efficiency programs can vary widely and each one has a unique customer base, in many cases energy efficiency programs must be tailored accordingly. To address this challenge, TVA officials said that TVA must provide a range of program options across all end-use customer classes and allow for delivery by the distributor directly or by TVA staff and its contract program administrators.

- *Relatively low electricity rates*. TVA has concerns that energy efficiency programs could make it more difficult to keep rates as low as feasible, as the TVA Act requires. TVA officials stated that energy efficiency efforts will likely raise rates by less than 1 percent, but some industry experts said that rate increase can be offset because a consumer's overall electricity bill may be lower as total energy use decreases.

- *Rate structure*. Before April 2011, TVA's distributor customers were charged the same electricity rate regardless of the time of day or season, so customers did not receive strong price signals that

[52]Utilities serving California and Connecticut, for instance, must consider cost-effective energy efficiency before other resources. See Cal. Pub. Util. Code § 454.5 (b)(9)(C) and Conn. Gen. Stat. § 16a-35k.

encouraged them to save energy.[53, 54] According to TVA officials, beginning in April 2011, TVA started charging rates that vary by season and depending on the time of the day for peak and off-peak periods.[55] TVA officials said that this could reduce distributor revenue but also reduce growth in peak electricity demand, allowing TVA to avoid or delay the construction of costly new generation and peak power purchases from the market.

- *Economic downturn*. Significant technological improvements are needed to support an energy efficiency infrastructure and achieve TVA's stated energy efficiency goals, according to TVA officials. For example, such improvements are most easily installed during construction of new buildings, but poor economic conditions have slowed new home construction, reducing opportunities for market penetration by energy-efficient technologies.

- *Measurement and verification of savings*. TVA, like many utilities, faces challenges measuring and verifying savings achieved through energy efficiency. According to TVA officials, to address this challenge TVA has contracted with a third party to provide a framework for measurement and verification.

TVA does have some advantages concerning energy efficiency programs that other utilities lack. Most notably, it does not need approval from public service commissions for energy efficiency plans and budgets, unlike investor-owned utilities. Under TVA practices, subject to distributor

[53]TVA's end-use wholesale rate combines fixed and variable costs into one energy charge, effectively removing demand charges and any incentive to reduce demand during peak periods. Thus, if there is an increase in electricity demand, there is no change in the price per kilowatt-hour at any time during the day.

[54]TVA's distributors are not-for-profit and must receive enough revenue from electricity sales to cover fixed costs necessary to provide reliable electrical distribution. TVA's distributors have raised concerns that energy efficiency programs could reduce their revenues. TVA, its distributors, and the Tennessee Valley Public Power Association—an advocacy group serving more than 100 municipal electric systems and 50 electric cooperatives in TVA's service area—recently agreed on a time-of-use rate structure intended to mitigate concerns about the impacts of increased rates, as well as give distributors greater opportunities to manage their system during peak periods, for example by promoting energy efficiency.

[55]At the distributors' request, TVA is also offering an optional seasonal rate that varies only by season—and not intra-day—as an option during the transition to the new rate structure through 2012.

participation, this could allow TVA to adopt energy efficiency measures and increase rates more quickly and aggressively, if it were to decide this is desirable.

TVA's Financial Condition May Hamper Its Ability to Fund Capital Improvements

TVA's financial condition may hamper its ability to fund planned capital improvements over the next several years. TVA plans to spend about $9.9 billion by fiscal year 2013 for various capital projects, including completing the construction of one nuclear power plant, upgrading existing fossil fuel plants, and finishing various environmental and transmission projects. Unexpected cost overruns, however, may negatively affect TVA's ability to make these planned capital investments. In addition, these investments may be constrained by limited financial flexibility due to existing debt levels, the fact that TVA can only finance with debt, and projected increases in operating costs.

TVA's Planned Capital Investments May Be Affected by Cost Overruns

TVA plans several large capital investments—notably in capacity expansion, environmental measures, and transmission—but unexpected cost overruns may impact its ability to make these investments.

TVA Plans to Spend Billions in Capital Investments

By the end of fiscal year 2013, TVA plans to spend almost $9.9 billion for various capital projects, including completing the construction of the nuclear power plant Watts Bar Unit Two, expanding the capacity of existing nuclear and fossil fuel plants, and conducting various environmental and transmission projects. TVA officials estimated in March 2011 that bringing Watts Bar to full operational status would cost almost $1.8 billion from fiscal years 2010 through 2012. In addition, TVA anticipates that it will need $878 million by the end of fiscal year 2013—and almost $2 billion by fiscal year 2021—to expand the operating capacity of several of its natural gas-fired plants. TVA has also budgeted $471 million for the conversion of six wet ash storage ponds to dry ash storage, including the installation of gypsum dewatering facilities.[56] A summary of TVA's planned capital investments is shown in table 1. This table represents TVA's current schedule of planned capital investments, which TVA could reschedule or postpone if necessary.

[56]Wet ash plants store coal ash in water-covered landfills. Dry ash is waste vacuumed out and collected in silos, before being transported to landfills.

Table 1: TVA's Capital Investments for Fiscal Years 2010 to 2013

(Dollars in millions)

	Fiscal year				
Actual and planned capital investments	**2010**	**2011**	**2012**	**2013**	**Total**
Capacity expansion					
• Nuclear (Watts Bar Unit Two, Bellefonte Unit One, Browns Ferry power up-rates; and property acquisitions, reclassified prior year nuclear training costs[a])	633	912	1,139	917	**3,601**
• Fossil (plants upgrades, power train modernization, miscellaneous small projects)	425	318	114	21	**878**
• Hydropower (power train modernization, miscellaneous small projects)	6	5	7	5	**23**
Total capacity expansion	**$1,064**	**$1,235**	**$1,260**	**$943**	**$4,502**
Other capital projects[b]					
• Nuclear	168	234	279	261	**942**
• Fossil	223	344	304	366	**1,237**
• Hydropower	55	73	33	61	**222**
• Miscellaneous projects	150	128	168	152	**598**
Total other capital projects	**$596**	**$779**	**$784**	**$840**	**$2,999**
Transmission	$202	$249	$271	$280	**$1,002**
Environmental	$58	$100	$219	$513	**$890**
Ash pond remediation	$103	$141	$107	$120	**$471**
Total capital investment	**$2,023**	**$2,504**	**$2,641**	**$2,696**	**$9,864**

Source: GAO analysis of TVA data.

[a]The reclassification of prior year training costs represents improperly capitalized fiscal year 2009 nuclear training costs. These costs were reclassified as a regulatory asset in fiscal year 2010.

[b]Other capital projects include a variety of asset-related work, including equipment replacement or modification, security upgrades, facility modifications, and the acquisition of new systems.

TVA faces a number of significant environmental capital costs in addition to those shown in table 1. In April 2011, TVA settled with EPA and agreed to invest $3 billion to $5 billion during the next 10 years on new and upgraded pollution controls to resolve alleged Clean Air Act violations at 11 of its coal-fired plants in Alabama, Kentucky, and Tennessee. As part of the settlement, TVA plans to invest $350 million on projects to reduce pollution, save energy, and protect public health and the environment. While TVA plans to spend $471 million in ash remediation capital costs through 2013, total remediation costs are estimated to range from $1.5 billion to $2 billion over the next 10 years.

TVA Does Not Have a Formal Capital Expenditure Management Plan

According to senior TVA officials, including TVA's Senior Vice President and Treasurer, TVA recognizes the need to manage the funding for its planned capital investments, or expenditures; however, TVA does not have a formal capital expenditure management plan. Such a plan would identify the assets that the agency intends to acquire, the full costs of those assets, and the sources of funding for acquiring those assets. Office of Management and Budget guidance identifies several potential problems that could occur when an agency has no formal capital expenditure management plan, including poor planning, acquisition of assets not fully justified, higher acquisition costs, cancellation of major investments, the loss of sunk costs (i.e., prior costs that cannot be recovered), and inadequate funding to maintain and operate the assets.[57] Therefore, the lack of an effective plan may impede TVA's long-range financial planning.

Unexpected Cost Overruns May Affect TVA's Planned Capital Investments

TVA and other utilities have historically experienced significant delays or cost overruns with nuclear plant construction projects, and could potentially face similar issues in the future.[58] During the 1990s, TVA's nuclear plant construction projects experienced significant construction delays and cost overruns. For example, as we reported in August 1995,[59] between 1990 and 1994, the construction costs of TVA's Watts Bar Unit One and Browns Ferry Unit Three increased by a total of about $2.74 billion, about 45 percent of their combined cost, and the scheduled completion dates slipped by more than 3 years. Other electric utilities have experienced similar issues. For example, in 2007, Progress Energy announced the construction of two proposed nuclear power units in Levy County, Florida, which were initially estimated to cost $17.2 billion; however, in April 2010, Progress Energy revised the cost estimate to

[57]Office of Management and Budget, *Preparation, Submission and Execution of the Budget*, OMB Circular A-11 (Washington, D.C., July 21, 2010).

[58]According to the Congressional Budget Office, the 75 nuclear power plants built in the United States between 1966 and 1986 had an average cost overrun of more than 200 percent. Congressional Budget Office, *Nuclear Power's Role in Generating Electricity*, Pub. No. 2986 (Washington, D.C., May 2008). As we testified in March 1981, TVA experienced a 166 percent increase in estimated construction costs and deferrals of the completion dates of 4 nuclear units, and unintended delays of other nuclear units. GAO, *Tennessee Valley Authority Electric Power Rates*, 088863 (Washington, D.C.: Mar. 16, 1981).

[59]GAO, *Tennessee Valley Authority: Financial Problems Raise Questions About Long-Term Viability*, GAO/AIMD/RCED-95-134 (Washington, D.C.: Aug. 17, 1995).

more than $22 billion, an increase of almost 28 percent. In September 2011, TVA officials clarified that in August 2011 TVA's Board decided that the agency would complete Bellefonte Unit One at an estimated cost of $4.9 billion in the time frame ranging from 2018 through 2020. Furthermore, TVA is still studying the feasibility of Bellefonte Unit Two completion and is unsure about the associated cost.[60, 61] Given historical trends in nuclear construction, TVA faces risks that its estimated construction costs could increase. Leading credit-rating agencies in the United States, such as Moody's and Standard and Poor's, cite construction delays, cost overruns, shortages in engineering and construction workers, and environmental and security uncertainties as obstacles facing the industry in implementing and financing such projects.

TVA officials told us that TVA has learned from its historical experience with nuclear power, positioning it to avoid such problems in the future. They also told us that TVA can build nuclear power plants more economically than other utilities because it owns several nuclear units that are already partly completed. Furthermore, TVA plans to construct the units one at a time in order to learn from any unanticipated problems that could cause delays and cost overruns. In 2007, TVA restarted its Browns Ferry Unit One—the first nuclear power unit brought into production in the United States since Watts Bar Unit One was started in 1996. Browns Ferry Unit One had been operational when it was shut down in 1985, and TVA had performed sufficient maintenance for its operating license to remain valid; however, restarting the unit cost TVA approximately $1.9 billion. TVA has budgeted $2.5 billion for Watts Bar Unit Two, even though this unit was never fully operational and TVA estimated that it was only 50 to 60 percent complete before restoration work commenced in 2007. According to senior TVA officials, as of April 2011, the construction of Watts Bar Unit Two was on schedule and within budget.[62] However, they did not provide any documentation supporting

[60]Previously, according to TVA officials and information from TVA's 2010 power supply plan, TVA had planned to finish construction on two additional units—Bellefonte Unit One in 2018 and Unit Two in 2021—at a total cost of $8.3 billion.

[61]Although TVA's power supply plan includes estimates of the potential costs of various capacity expansion projects, it does not examine other planned capital expenditures, such as transmission or environmental projects. TVA officials stated that when TVA runs its models, the model considers needed transmission assets that are associated with specific generation assets and any needed environmental improvements.

[62]On August 8, 2011, TVA announced that commercial operations at Watts Bar Unit Two would be delayed due to construction and licensing delays.

the completion of construction by 2013 or detailed estimates of the remaining costs. Based on TVA's historical experiences with the construction of nuclear power plants, and because Watts Bar Unit Two was never fully operational, we are concerned that TVA's estimates of the total costs of bringing the unit into production by 2013 may be low.

TVA's Planned Capital Investments May be Constrained by Existing Debt and Limited Financial Flexibility

Existing Debt Levels Could Affect TVA's Planned Capital Investments

TVA may face challenges making its planned large capital investments because of existing debt levels. Debt is the only way, other than the sale of electricity, for TVA to fund capital investments, since it is not authorized to issue stock and is required by statute to keep its rates as low as feasible.[63] According to the Edison Electric Institute,[64] the electric utility industry is the second most capital-intensive sector in the United States—surpassed only by the railroad industry—due to its extensive investments in the construction and maintenance of power plants and transmission lines. TVA's investment decisions are critical to its future success and involve large commitments of capital. These critical decisions include how much to invest in maintaining and upgrading existing plants versus developing new generating capacity, and how these investments will be funded.

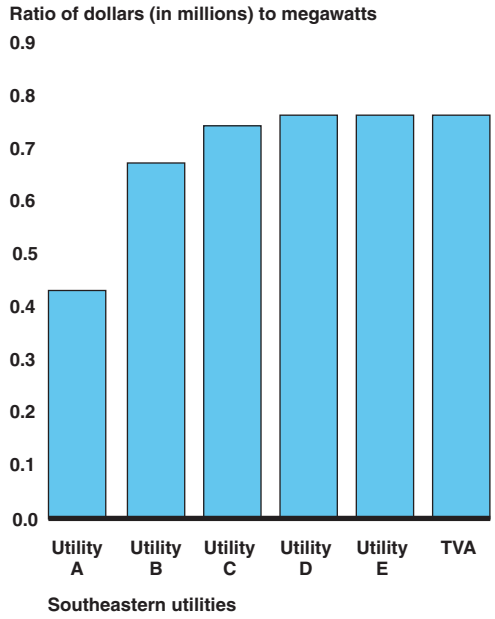
One way of examining a utility's financial position is to compare its long-term debt and equity to its peak summer capacity. We compared this measure for five southeastern utilities with TVA's long-term debt and peak summer capacity, and found that TVA is similar to three of the five, as shown in figure 11, with a ratio of about $0.76 million dollars in debt and

[63]TVA was originally funded primarily by appropriations from Congress. Since 1959, the majority of those appropriations have been repaid to the U.S. Treasury by TVA. TVA's proprietary capitalization consists of the remaining amounts of the original appropriations made by Congress.

[64]The Edison Electric Institute is an association of U.S. investor-owned electric utilities. Its members serve 95 percent of the customer base for investor-owned utilities and represent approximately 70 percent of the U.S. electric utility industry.

equity per MW of capacity. However, direct comparisons are difficult because of the differences in financing structures for these utilities. TVA must finance its assets through the use of debt and operating revenues alone, while these other five utilities may also finance with equity. TVA is also the only utility with a statutory debt ceiling.

Figure 11: Comparison of Long-Term Debt and Equity to Peak Summer Capacity for TVA and Five Southeastern Utilities in 2009



Sources: GAO analysis of southeastern investor-owned utilities, TVA, and EIA data.

Note: To protect the proprietary nature of the data, we assigned labels to the individual utilities. The labels used in this figure do not correspond with labels used elsewhere in the report.

Although TVA has identified planned capital projects and determined the potential costs of those projects, it has not identified how specific, individual projects will be funded, which is a critical component of the financial decision-making process.

Senior TVA officials have stated that they expect to fund TVA's planned capital expenditures from fiscal years 2010 to 2020 with new debt, in compliance with its financial guiding principles.

TVA's Financial Guiding Principles

Retire debt over the useful life of assets.

- Accelerated retirement results in accelerated debt pay down.
- Asset life extensions result in extension of debt pay down.

Issue new debt for new assets.

- Only programs or specific projects greater than $100 million will be considered.
- Capacity expansion, clean air, ash remediation, or asset useful life extensions.
- Major modifications (e.g., replacement of steam generators, Browns Ferry Nuclear Plant modifications to increase the generating capacity) may be considered.

Use regulatory treatment for asset-related, specific and unusual events. Under generally accepted accounting principles, a rate-regulated entity is allowed to defer certain expenses and revenues as assets and liabilities that normally would be charged to the statement of operations as expense or revenue.

- Only items greater than $100 million will be considered.
- Examples include the Bellefonte Nuclear Plant (recovery over 10 years) and cleanup efforts for the Kingston power plant ash spill (recovery over useful life of 15 years).
- Non-asset-related regulatory treatment maintained for previous board-approved items.

Rate adjustments as necessary to fund operating expenses.

- Fuel and purchase power, operations and maintenance, maintenance capital, interest, and taxes.
- Debt retirement in line with asset useful life.

Evaluate rate actions to avoid significant rate volatility.

- Consider significant out-year increases in operating expenses.

Implement rate actions to maintain financial flexibility.

- Consider financial constraints when establishing multiyear rate outlook.

Source: TVA Financial Guiding Principles, August 2010.

According to TVA officials, existing debt and other obligations—including TVA's alternative financing arrangements—will be gradually paid off and new debt issued. These officials told us they use $28 billion as a planning threshold for debt, so as to maintain a $2 billion debt "cushion" to help

ensure that TVA does not exceed its $30 billion debt ceiling.[65] According to the TVA Inspector General, approaching or reaching this debt ceiling could adversely affect TVA's business by limiting its ability to borrow money and increasing the cost of servicing its debt.

According to TVA officials, TVA plans to comply with its guiding principles by maintaining an average debt life less than the average life of the underlying assets, although TVA's total debt may increase in order to invest in new assets. For example, during fiscal years 2011 through 2013, TVA plans to issue new debt to finish the construction of two nuclear power plants, as well as to upgrade three existing natural gas-fired plants to extend their operational asset life. TVA officials stated that TVA's statutory debt levels will remain within the $30 billion limit on bonds and notes as long as that remains the legal limit.

If the $28 billion planning threshold were to be exceeded, TVA's senior officials said they would immediately begin to examine various options for modifying the debt structure and adjusting TVA's capital investments. For example, TVA plans to reduce its current existing debt and other obligations and issue new debt as needed. TVA is also working to balance the amount of its debt that matures in any given year, spreading maturities over time in order to reduce exposure to interest rate volatility. In addition, since interest rates are at historic lows, TVA, as of September 30, 2010, had 100 percent of its outstanding long-term debt in fixed-rate securities. TVA has modified its debt structure and has sought opportune times to refinance debt, in some cases doing so before the due dates at advantageous rates. As a result, TVA maintains a relatively low cost of capital. For example, TVA's financing expense as a percentage of revenue decreased from approximately 25.7 percent in fiscal year 2000 to 11.3 percent in fiscal year 2009.

Increases in Operating Expenses Could Reduce Funds Available for Capital Investments

Adjusted for inflation, TVA's operating expenses have increased from about $8.7 billion in fiscal year 2005 to about $10 billion in fiscal year 2010—an increase of about 15 percent.[66] For example, fuel and

[65]TVA officials stated that they may seek either an increase to the statutory debt ceiling, an alternative to measure its financial health, or some combination of both. TVA officials said that they recognize this change will require Congressional authorization

[66]All historical nominal values as well as inflation adjusted values for fiscal years 2005 to 2010 are reported in table 2.

purchased power costs increased $328 million during this time. TVA officials said they expected operating expenses will continue to rise,[67] which would affect the amount of net income that TVA could use for investing in planned new facilities. In 2011, TVA officials estimated that nonfuel operating and maintenance costs would increase over the next 10 years—from about $3.3 billion in fiscal year 2011, adjusted for inflation, to about $3.9 billion in fiscal year 2021, adjusted for inflation—an increase of more than 19 percent.[68] These officials said that they expect that fuel costs and interest payments will also rise, although they said that the amount of the increase is difficult to estimate or predict. If TVA starts operating new facilities as planned, this would also increase maintenance costs.[69]

TVA's gross revenues come primarily from the sale of electricity and are used to fund TVA's annual operating expenses, including fuel and purchased power, operating and maintenance costs, interest, and other costs.[70] The revenue that remains after deducting operating expenses from gross revenue is net income (see table 2). TVA can use its net income to fund a variety of financial needs, such as paying down its debt or covering unexpected costs. It could also use net income, along with new debt, to help fund future capital investments. Although TVA's net income increased from $96 million, adjusted for inflation, in fiscal year 2005 to $982 million, adjusted for inflation, in fiscal year 2010, TVA did not significantly reduce its debt during this period. TVA has reported that it is difficult to reduce annual costs by reducing nonfuel operating and maintenance costs or postponing scheduled capital expenditures.

[67]Operating expenses include fuel and purchased power costs, operating and maintenance costs, depreciation, and amortization.

[68]In nominal values, TVA officials estimated that nonfuel operating and maintenance costs would increase over the next 10 years from about $3.3 billion in fiscal year 2011 to about $4.7 billion in fiscal year 2021—an increase of more than 42 percent.

[69]TVA, like most utilities, budgets regular maintenance costs as a percentage of an asset's depreciation.

[70]Gross revenues includes income from the sale of electricity and other activities related to TVA's utility operations or overall mission, including by-product sales or stewardship activities.

Table 2: TVA's Net Income for Fiscal Years 2005 to 2010

(Dollars in millions)

	Fiscal year					
	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Nominal values						
Gross revenue[a]	$7,849	$8,937	$9,381	$10,391	$11,280	$10,898
Operating expenses						
• Fuel and purchased power	2,601	3,342	3,449	4,176	4,745	3,219
• Operating and maintenance[b]	2,359	2,328	2,353	2,307	2,395	3,232
• Depreciation, amortization	1,154	1,500	1,473	1,224	1,598	1,724
• Interest payments	1,261	1,264	1,232	1,376	1,272	1,294
• Other expenses[c]	389	390	451	491	544	457
Total operating expenses	**$7,764**	**$8,824**	**$8,958**	**$9,574**	**$10,554**	**$9,926**
Net Income (gross revenue less total operating expenses)	**$85**	**$113**	**$423**	**$817**	**$726**	**$972**
Inflation adjusted values (in fiscal year 2011 dollars)						
Gross revenue[a]	$8,820	$9,710	$9,894	$10,714	$11,478	$11,007
Operating expenses						
• Fuel and purchased power	2,923	3,631	3,638	4,306	4,828	3,251
• Operating and maintenance[b]	2,651	2,529	2,482	2,379	2,437	3,264
• Depreciation, amortization	1,297	1,630	1,554	1,262	1,626	1,741
• Interest payments	1,417	1,373	1,299	1,419	1,294	1,307
• Other expenses[c]	437	424	476	506	554	462
Total operating expenses	**$8,724**	**$9,587**	**$9,448**	**$9,872**	**$10,739**	**$10,025**
Net Income (gross revenue less total operating expenses)	**$96**	**$123**	**$446**	**$842**	**$739**	**$982**

Source: GAO analysis of TVA financial information.

Note: Data may not add due to rounding.

[a]Gross revenue includes operating revenues, other income, unrealized gains (losses), and the effects of a change in accounting for assets.

[b]Operating and maintenance includes day-to-day operating expenses such as salaries and benefits, the monitoring and maintenance of equipment, and equipment repair.

[c]Other expenses include tax equivalents which are payments made to states and counties in lieu of taxes.

Adjusted for inflation, gross revenues have increased from about $8.8 billion in fiscal year 2005 to about $11 billion in 2010—an increase of almost 25 percent—due to the increase in demand for electricity. Our analysis of forecasts in TVA's 2010 power supply plan showed that TVA expects the demand will continue to increase over the next decade due to a number of factors, including increases in the population and levels of employment throughout the region. However, future revenues will also be

affected by weather, the economy, and other factors. For example, the economic downturn in fiscal year 2009 resulted in a decrease in the demand for power, and TVA experienced a 6.7 percent decrease in electricity sold in fiscal year 2009 compared to the prior year.

A coal ash spill at TVA's Kingston power plant in 2008 also created significant additional operating expenses. The collapse of a retaining wall released more than 1.2 billion gallons of water and coal ash, covering approximately 300 acres of adjoining property. TVA is conducting cleanup and recovery efforts in conjunction with federal and state agencies and estimates the work will be completed by the fourth quarter of fiscal year 2014. TVA estimates the total cost of the cleanup will be between $1.1 billion and $1.2 billion. However, actual amounts could exceed expected costs if, among other things, TVA has to remove more ash than currently anticipated, there are delays in the ash removal process, or the methods of final remediation change. Consistent with its financial guiding principles, TVA has deferred the cost of the Kingston power plant cleanup as a regulatory asset,[71] and plans to amortize such costs into operating expenses over a 15-year period, which it began to do in 2010.

TVA may also face additional operating expenses in the form of fines, penalties, and regulatory actions stemming from the Kingston ash spill. On June 14, 2010, the Tennessee Department of Environment and Conservation fined TVA approximately $12 million for the spill, citing violations of the Tennessee Solid Waste Disposal Act and the Tennessee Water Quality Control Act. TVA has not included certain additional costs in its estimates of the cleanup and recovery efforts, since it has determined that the costs are not probable or reasonably estimable. Specifically, it has not included other penalties, regulatory directives, natural resources damages, outcomes of lawsuits, future claims, long-term environmental impact costs, final long-term disposition of the ash processing area, costs associated with new laws and regulations, or costs of remediating any mixed waste discovered during ash removal process. Such costs could increase TVA's operating expenses and affect its ability to fund its planned capital investments.

[71]A regulatory asset is an asset owned by a rate-regulated entity for which certain revenues and expenses are deferred and not charged to the statement of operations. Instead, they are classified as assets and liabilities, which are then amortized over time.

Economic conditions could increase the need for TVA to make substantial contributions to its pension fund due to lower than anticipated returns on investments within the fund. As of September 30, 2010, TVA's pension fund liability was more than $10.3 billion; however, at that time, the fund's assets were valued at less than $6.8 billion, which amounts to an estimated $3.6 billion shortfall. The plan currently has nearly 23,000 retirees receiving benefits, totaling about $600 million per year. TVA is looking at various options for modifying the management of the pension fund, which could include revising existing pension plans or developing new ones. According to TVA officials, a contribution of $270 million to the pension fund has been budgeted in fiscal year 2011,[72] and TVA's Board approved plans to contribute up to $300 million to the pension plan in fiscal year 2012.

Finally, in addition to the specific planned financial investments discussed previously in this report, TVA must find the resources to achieve the agency's broad objectives, including the TVA Board's commitment to be a "national leader in technological innovation, low cost power and environmental stewardship." Achieving these broad objectives could require additional investments.

Conclusions

TVA has set energy and environmental goals in its 2007 strategic plan and its August 2010 renewed vision and has taken steps to increase its use of energy efficiency programs. Utilities typically try to meet future demand for electricity by identifying the most cost-effective ways of doing so. However, while TVA's strategic plan states that TVA will strive to be a leader in energy efficiency improvements, it is not clear whether TVA is making the most cost-effective resource decisions possible to meet future electricity demand, especially with regard to energy efficiency. That is because TVA's planning process may be ignoring opportunities to pursue a more cost-effective path that could make greater use of energy efficiency. More specifically, TVA's resource planning framework and decisions have not yet incorporated an analysis of the full potential for energy efficiency that exists in its service area, although TVA has commissioned a study on this. In addition, TVA did not use its planning model to identify the most cost-effective levels of energy efficiency, and, as a result, it does not know whether the model would have identified

[72]TVA made a cash contribution of $1 billion to the pension plan in fiscal year 2009.

other potentially more cost-effective levels of this resource. Energy efficiency has been shown to be a generally cost-effective option compared to new generating capacity, and energy efficiency efforts at other electric utilities show that it is possible to use energy efficiency at much higher levels. By not fully exploring and identifying energy efficiency resources, TVA cannot be certain that its plans to meet future demand, largely by building new generating capacity, are the most cost effective.

TVA is planning to spend billions of dollars on several large capital investments over the next 3 years and faces increasing operating expenditures in order to meet demand for electricity in its service area. TVA faces difficult decisions as it plans for these investments and other significant expenses related to environmental cleanup or protection. As of September 30, 2010, TVA's statutory debt was $23.6 billion, and it plans to spend about $10 billion through fiscal year 2013 for capital expenditures related to new and upgraded nuclear, fossil fuel, and hydropower plants. Moreover, pursuant to a settlement with EPA, TVA agreed to invest an additional $3 billion to $5 billion in the next 10 years on pollution control devices on existing power plants. Collectively, these expenditures could cause TVA to exceed its statutory debt limit. TVA's options for addressing its financial challenges include (1) raising rates to increase gross revenue, (2) reducing operating expenditures, (3) delaying some capital investments, and (4) modifying its debt structure. TVA's debt structure can be modified by refinancing its debt, developing additional alternative financing arrangements, or requesting an increase in its debt ceiling. Each of these options involves trade-offs that complicate the agency's financial decision making. For example, TVA could raise its rates, and with the additional revenue generated, reduce its borrowing or pay down some of its existing debt. However, the TVA Act also mandates that TVA keep rates as low as feasible, and raising rates could affect the Tennessee Valley economy.

Despite the many financial decisions it faces, TVA does not have a formal capital expenditure management plan that lays out how it will fund the significant capital investments it expects to make during the next 3 years. Such a plan is important to help identify the assets in which TVA plans to invest, the full costs of the assets, and the sources of funding for acquiring those assets to ensure that adequate funding exists to maintain and operate the assets. Without such a plan, TVA faces increased risk that its planned capital investments are not sufficiently justified or that the acquisition costs of these capital investments will rise, potentially leading to the cancellation or delays of major investments and the loss of sunk costs. Further, in the absence of a capital expenditure management plan, TVA may also face challenges in achieving the full range of the Board's

stated objectives, including its commitment to be a "national leader in technological innovation, low cost power and environmental stewardship."

Recommendations for Executive Action

Consistent with TVA's goals, objectives and policies, including TVA being a national leader in technological innovation, low-cost power, and environmental stewardship, and to better ensure that TVA has the financial resources to accomplish the Board's broader objectives, we recommend that TVA's Board:

- use information on the energy efficiency potential of TVA's service area from its commissioned study to better ensure that TVA's future resource planning process reflects the most cost-effective mix of resources to meet the demand for electricity, and
- develop a written capital expenditure plan that includes the full costs of the assets in which TVA plans to invest and the sources of funding for acquiring those assets.

Agency Comments and Our Evaluation

TVA provided oral technical comments to our draft, and we incorporated them as appropriate. In its written comments, TVA agreed with our first recommendation, and while TVA did not expressly agree with our second recommendation, it noted the importance of utility companies having a written capital expenditure plan. TVA further stated that it is working to refine and improve its long-term planning processes and intends to more formally integrate them. We encourage TVA's efforts in this regard. However, TVA's current planning processes do not address how its planned capital investments will be funded. For example, TVA's vision establishes broad agency priorities and goals and provides a structure for TVA's budget cycle and capital expenditures, but the vision does not address how these items will be funded. As we stated in the draft report, several potential problems can occur when an agency does not describe how capital expenditures will be funded, including poor planning, acquisition of assets that have not been fully justified, higher acquisition costs, cancellation of major investments, and inadequate funding to maintain and operate the assets. TVA also remained silent on a critical component of our second recommendation, which is to describe the manner in which TVA will fund future investments, notably its planned $9.9 billion in capital investments by the end of fiscal year 2013. As we stated in our draft report, TVA's planned capital investments and financial flexibility may be constrained by increased operating costs, existing debt levels, and unexpected cost overruns.

In its comments, TVA also noted its need for financial flexibility in the funding of long-term assets. We acknowledge this need but believe that a more detailed blueprint for the funding of planned capital expenditures, including information on how TVA expects to manage its expenditures, would better assist TVA in prudently making its capital investments and in achieving greater financial flexibility and responsibility in the long-term. Accordingly, we reiterate the importance of a formal capital expenditure plan that not only identifies the assets that TVA intends to acquire or develop, but includes the full costs of the assets in which TVA plans to invest and the sources of funding for acquiring those assets.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution of this report until 30 days from the report date. At that time, we will send copies to TVA's board of directors, appropriate congressional committees, and other interested parties. In addition, this report will also be available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or ruscof@gao.gov, or Susan Ragland at (202) 512-9095 or raglands@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.

Sincerely yours,

Frank Rusco
Director, Natural Resources
and Environment

Susan Ragland
Director, Financial Management
and Assurance

Appendix I: Scope and Methodology

Our report objectives were to examine (1) how the Tennessee Valley Authority (TVA) plans to meet future demand for electricity and how TVA's resource planning and forecasts compare to plans and forecasts from other sources, (2) TVA's efforts to use energy efficiency to meet demand for electricity, and (3) TVA's financial condition and how it affects TVA's ability to meet its operational and financial goals.

To address our first objective, we collected and reviewed TVA's most recent long-term plans, including its long-term financial plan and capacity expansion plan (or "power supply plan"). As part of this analysis, we identified key variables related to TVA's demand forecasts and its plans to supply electricity. We also gathered information about alternative supply resources that can affect the amount of power TVA would need to generate from its own capacity, including TVA's plans to purchase power and invest in energy efficiency and demand response programs. Additionally, we interviewed TVA officials familiar with the agency's resource planning process.

We collected annual data from TVA on key demand forecasts and supply plans used to develop its long-term plans. With respect to demand for electricity, we looked at TVA's forecasts of its peak load and electricity sales. We also examined several factors influencing the demand for electricity, including forecasts of population, per capita income, and employment for TVA's service region. With respect to supply for electricity, we reviewed TVA's plans to expand its generating capacity and generate electricity.

We compared TVA's forecasts and plans for these key variables to relevant forecasts and plans from other sources, such as the Department of Energy's Energy Information Administration (EIA), IHS Global Insight, and a group of investor-owned electric utilities. The purpose of these comparisons was to determine whether TVA's forecasts were markedly different in any key areas.

In our comparisons, we focused on annual forecasts and plans for geographical regions similar to TVA's service region. We examined EIA's forecasts related to electricity demand and supply for the East South Central census region and for the Southeastern Electric Reliability

Council (SERC) Region.[1] From IHS Global Insight we focused on forecasts for the East South Central census region. We also examined forecasts and plans for five electric utilities from either the SERC Region or the southeastern United States, as the following describes.

We selected a nonprobability sample of five utilities based on their similarity to TVA across a variety of dimensions that are relevant to forecasting, planning, and investment. We selected these regional utilities through the following steps:

1. We compiled a list of 13 large, investor-owned utilities in the SERC Region or in the southeastern United States that did not have a legal prohibition against nuclear generation. These utilities were: Alabama Power, Duke Carolinas, Entergy Arkansas, Entergy Louisiana, Entergy Mississippi, Entergy New Orleans, Florida Power & Light, Georgia Power, Progress Carolinas, Progress Florida, South Carolina Electric & Gas, Union Electric, and Virginia Dominion Power.

2. We scored each utility based on its similarity to TVA on each of the following dimensions:

   - capacity (a number was calculated to represent how close each utility's generating capacity was to that of TVA),
   - average age of coal plants (a number was calculated to represent how similar the average age of each utility's coal plants was to that of TVA),
   - proportion of energy derived from coal (a number was calculated to represent how close each utility was to TVA in its proportion of energy derived from coal),
   - proportion of energy derived from natural gas (a number was calculated to represent how close each utility was to TVA in its proportion of energy derived from natural gas),

[1]See figure 1 for a map of TVA's service region. The East South Central census region comprises Alabama, Kentucky, Mississippi, and Tennessee. SERC, also known as the SERC Reliability Corporation, is a nonprofit corporation responsible for promoting and improving the reliability, adequacy, and critical infrastructure of the bulk power supply systems in all or portions of 16 southeastern states.

- proportion of energy derived from nuclear power (a number was calculated to represent how close each utility was to TVA in its proportion of energy derived from nuclear power),
- proportion of energy sold to industrial customers (a number was calculated to represent how close each utility was to TVA in its proportion of energy sold to industrial customers), and
- financial similarity (for each utility, we calculated the ratio of its debt and equity to its revenues and then calculated a number to represent the closeness of this ratio to an analogous ratio for TVA).

3. We combined these scores to yield an overall measure of each utility's similarity to TVA. For each utility, this overall measure of similarity was calculated as a weighted average of its scores on the several dimensions described in step 2. We chose the weights based on our judgment of the relative importance of each dimension to a utility's forecasting, planning, and investment.
4. The utilities were ranked according to their overall similarity to TVA.
5. In order to check that the ranks were not heavily dependent on the weights we chose in step 3, steps 3 and 4 were repeated using four different distributions of weight over the seven dimensions. These four different weighting schemes were designed to cover a reasonable range of ways in which the dimensions (capacity, average age of coal plants, etc.) might be important to forecasting, planning, and investment. All four weightings yielded the same top-six-ranked utilities with the exception that one of the weightings differed from the others in which utilities were ranked 5 and 6.

The five utilities with highest similarity to TVA were selected, except that one utility, Alabama Power, was skipped to ensure that the final sample not include two utilities from the same parent company (Georgia Power, also owned by the Southern Company, had already been selected due to its higher similarity to TVA). The final selection of utilities was Duke Carolinas, Progress Carolinas, Virginia Dominion Power, Union Electric, and Entergy Arkansas. The TVA Inspector General has also considered these five utilities as comparable to TVA in terms of capacity and location for benchmarking purposes.

To gather information for the comparisons with TVA, we distributed a questionnaire to each of the five utilities asking for historical and forecast

information on peak load; electricity sales; generation and generation capacity, including renewable sources; demand and supply "drivers" (such as population, regional income, fuel prices, and capacity construction costs); energy efficiency and demand response programs; and related regulatory issues. We asked for such data on an annual basis. This questionnaire was pretested to ensure that questions were clear and answerable, by means of an extended interview with officials at one of our selected utilities. The remaining four utilities received the questionnaire only after it had been pretested and revised. We then conducted follow-up interviews with the appropriate resource planning officials at these utilities, as necessary, to clarify the information and to ensure consistency of the data and information collected.

To compare the information we collected from other sources to TVA's long-term forecasts and plans, we computed the annual growth rate for each data series describing a forecast or set of plans. We used two methods to compute the growth rates, and they yielded similar results. The first method estimates the annual growth rate from a least squares regression of the natural logarithm of the data series on a constant and a time trend. The second method calculates the compound annual growth rate. The results for each method are summarized in appendix II.

In some cases, we adjusted the data before computing the growth rates to improve the comparisons. For example, we received fiscal year data on forecasts of electricity sales and plans for electricity generation from TVA, and we received calendar year data on similar forecasts from other sources. To avoid comparing fiscal year data from TVA to calendar year data from other sources, we interpolated calendar year values for TVA based on the span of its fiscal year, from October 1 of one calendar year to September 30 of the next calendar year. To compare real income growth on a per capita basis, we used data on real income and population to compute real income per person.

We compared TVA's past performance to future projections, other utilities, the opinions of industry experts, and data provided by knowledgeable third-party sources to determine the extent, if at all, to which TVA's forecasts and selection of values for key assumptions deviated from what may be expected.

To address our second objective, we reviewed TVA's most recent power supply plan as well as historical data from EIA. We also reviewed TVA's interim and final strategic planning documents, which provide information on TVA's energy efficiency and renewable energy resources, planning

methods, policies, and goals. We interviewed TVA officials and reviewed documents associated with TVA's load forecasts and resource plans to (1) evaluate TVA's assumptions and goals associated with its use of energy efficiency, renewable energy, and power purchases, and (2) determine the extent to which these resources are included in TVA's power supply plan.

We also compared TVA's energy efficiency and renewable energy programs and efforts to those of 11 other utilities. These included the five regional utilities that were chosen in the first objective, as well as a sixth regional utility, Georgia Power, because it also had sufficient data for comparisons. In addition, we selected five national utilities because they were identified by industry sources and TVA as leaders in energy efficiency or renewable energy, and because they were in the top 2 percent of utilities nationwide in total energy saved from energy efficiency and total spending on energy efficiency programs. Including these national utilities allowed us to examine differences between TVA's programs and some of the highest-performing energy efficiency and renewable energy programs in the country. We also informed our selections through discussions with officials from nongovernmental energy efficiency and renewable energy associations, including the American Council for an Energy-Efficient Economy, the Southeast Energy Efficiency Alliance, and the Southern Alliance for Clean Energy. Through this process we selected Austin Energy, Connecticut Power and Light, Southern California Edison, Pacific Gas & Electric Company, and Northern States Power Company (Xcel Energy–Minnesota).

We provided a standard questionnaire to the 11 utilities addressing operations, energy efficiency and renewable energy programs, and incentives and disincentives relating to such programs. Ten out of the 11 utilities responded to our questionnaire. We conducted follow-up interviews with utility officials, as necessary, to clarify the responses and to ensure consistency of the data and information collected in order to facilitate comparisons with TVA. We also collected data from TVA and EIA in order to assess and compare energy efficiency and renewable energy initiatives with those of TVA.

To examine TVA's primary incentives or impediments to more energy efficient or renewable energy practices, we interviewed officials from TVA and the Tennessee Valley Public Power Association, which represents TVA's distributors. In order to determine factors that encourage or discourage energy efficiency and renewable energy practices, we reviewed industry studies and interviewed or corresponded with officials from four public service commissions (California, Connecticut, Maryland,

and Vermont), three energy sector associations (American Council for an Energy-Efficient Economy, the Southeast Energy Efficiency Alliance, and the Southern Alliance for Clean Energy), the Northwest Power and Conservation Council, and the National Renewable Energy Laboratory. We also reviewed state laws and regulations that affect energy efficiency and renewable energy programs. We then characterized the incentive structures, regulatory policies, and governance systems associated with leading energy efficiency and renewable energy programs, and compared these to TVA's current policies and plans.

To address our third objective, we examined TVA's most recent strategic planning documents, including its 2007 strategic plan; debt management policies; and anticipated capital expenditures. We interviewed TVA officials to discuss the impact of its debt levels on its ability to implement its missions and goals, including its current debt financing strategy, planned capital investments, and nuclear decommissioning costs. We obtained and reviewed readily available audited financial information from the Securities and Exchange Commission for TVA to determine gross revenues, long-term debt, alternative financing arrangements, operating and maintenance expenditures, interest expenditures, and environmental costs. We met with auditors from TVA's Office of Inspector General and obtained and reviewed copies of its audit reports on TVA's financial performance, operations, and environmental stewardship. We also interviewed representatives of the Nuclear Regulatory Commission to discuss the status of TVA's nuclear decommissioning trust fund. We obtained and reviewed readily available audited financial information from the Federal Energy Regulatory Commission for five southeastern utilities to determine long term debt and equity. We also obtained and examined EIA electricity capacity data for TVA and the five southeastern utilities. We reviewed reports prepared by the American Public Power Association, Congressional Budget Office, and Congressional Research Service, and prior GAO reports related to TVA's financial condition to identify significant issues and deficiencies at TVA and any reportable conditions. We contacted TVA officials at field locations in Chattanooga and Knoxville, Tennessee, as necessary.

We conducted this performance audit from November 2009 through October 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: TVA Plans and Forecasts and Comparisons

TVA and other utilities develop forecasts of demand for electricity to inform their resource plans, such as how much and what kind of capacity to build, or how much power to buy from other sources. Other organizations, such as EIA and IHS Global Insight, also generate forecasts related to electricity demand and supply. Table 3 presents estimates of the average annual growth rate for key variables related to electricity plans and forecasts from TVA and other sources: peak demand, electricity sales, employment, population, real income per capita, total capacity, and electricity generation. For each key variable, average annual growth rates were calculated using two alternative methods. The first method involved estimating the average annual growth rate from a least squares regression of the natural logarithm of the data series on a constant and a time trend. The second method involved calculating the compound annual growth rate. Also shown in the tables is information related to the plans and forecasts, including the vintage, or the year, in which the plan or forecast was developed, and the region and time span covered by the forecast. For the Southeast utilities in our nonprobability sample, this information is described in table 4.

Table 3: Average Annual Growth Rates in Plans and Forecasts from TVA and Other Sources

					Average annual growth rate (percentage)	
Source	**Vintage**	**Variable**	**Region**	**Years**	**Regression method**	**Compound annual growth rate**
Peak demand						
TVA	2010	Peak demand (megawatt (MW))	Service	2010–2030	1.19%	1.23%
Southeast electric utilities	Various	Peak demand (MW)	Service	Various	0.85–1.92	0.86–1.95
Electricity sales						
TVA	2010	Electricity sales (gigawatt-hour (GWh))	Service	2010-2029	0.91	0.90
EIA, reference case	December 2009	Electricity sales (terawatt-hour (TWh))	SERC	2010–2030	0.98	1.04
EIA, high economic growth case	May 2010	Electricity sales (TWh)	SERC	2010–2030	1.35	1.44
EIA, high oil price case	May 2010	Electricity sales (TWh)	SERC	2010–2030	0.96	0.99
EIA, low economic growth case	May 2010	Electricity sales (TWh)	SERC	2010–2030	0.58	0.62

Source	Vintage	Variable	Region	Years	Average annual growth rate (percentage)	
					Regression method	Compound annual growth rate
EIA, low oil price case	May 2010	Electricity sales (TWh)	SERC	2010–2030	1.00%	1.10%
IHS Global Insight	September 2009	Electricity sales (GWh)	East South Central (ESC)	2010–2030	1.13	1.21
IHS Global Insight	September 2010	Electricity sales (GWh)	ESC	2010–2030	2.00	2.04
Southeast electric utilities	Various	Electricity sales (various)	Service	Various	1.03–2.08	1.09–2.08
Employment						
TVA	2010	Nonfarm employment	Service Region	2010–2030	0.90	0.99
EIA, reference case	December 2009	Nonfarm employment (millions)	ESC	2010–2030	0.33	0.64
EIA, high economic growth case	May 2010	Nonfarm employment (millions)	ESC	2010–2030	0.66	1.17
EIA, high oil price case	May 2010	Nonfarm employment (millions)	ESC	2010–2030	0.43	0.66
EIA, low economic growth case	May 2010	Nonfarm employment (millions)	ESC	2010–2030	-0.10	0.02
EIA, low oil price case	May 2010	Nonfarm employment (millions)	ESC	2010–2030	0.27	0.68
IHS Global Insight	April 2009	Nonfarm employment (thousands)	ESC	2010–2030	1.09	1.17
IHS Global Insight	May 2010	Nonfarm employment (thousands)	ESC	2010–2030	0.98	1.08
Population						
TVA	2010	Population	Service	2010–2030	0.92	0.92
EIA, reference case	December 2009	Population (millions)	ESC	2010–2030	0.60	0.60
EIA, high economic growth case	May 2010	Population (millions)	ESC	2010–2030	0.98	1.00
EIA, high oil price case	May 2010	Population (millions)	ESC	2010–2030	0.60	0.60

Source	Vintage	Variable	Region	Years	Average annual growth rate (percentage)	
					Regression method	Compound annual growth rate
EIA, low economic growth case	May 2010	Population (millions)	ESC	2010–2030	0.21%	0.21%
EIA, low oil price case	May 2010	Population (millions)	ESC	2010–2030	0.60	0.60
IHS Global Insight	April 2009	Population (thousands)	ESC	2010–2030	0.76	0.77
IHS Global Insight	May 2010	Population (thousands)	ESC	2010–2030	0.71	0.71
Southeast electric utilities	Various	Various	Various	Various	0.45–1.47	0.44–1.45
Real income per capita						
TVA	2010	Gross regional product per capita	Service	2010–2030	2.10	2.22
EIA, reference case	December 2009	Disposable income per capita	ESC	2010–2030	2.34	2.23
EIA, high economic growth case	May 2010	Disposable income per capita	ESC	2010–2030	2.29	2.29
EIA, high oil price case	May 2010	Disposable income per capita	ESC	2010–2030	2.33	2.17
EIA, low economic growth case	May 2010	Disposable income per capita	ESC	2010–2030	2.34	2.14
EIA, low oil price case	May 2010	Disposable income per capita	ESC	2010–2030	2.37	2.32
IHS Global Insight	April 2009	Gross regional product per capita	ESC	2010–2030	1.98	2.02
IHS Global Insight	May 2010	Gross regional product per capita	ESC	2010–2030	1.80	1.83
Southeast electric utilities	Not reported	Not reported	Not reported	Not reported	1.58–1.97	1.77–2.18
Total capacity						
TVA	2010	Total capacity (MW)	Service	2010–2029	0.97	0.99
EIA, reference case	December 2009	Total capacity (gigawatt (GW))	SERC	2010–2030	0.31	0.32
EIA, high economic growth case	May 2010	Total capacity (GW)	SERC	2010–2030	0.61	0.67
EIA, high oil price case	May 2010	Total capacity (GW)	SERC	2010–2030	0.31	0.29
EIA, low economic growth case	May 2010	Total capacity (GW)	SERC	2010–2030	0.06	0.01

Source	Vintage	Variable	Region	Years	Average annual growth rate (percentage)	
					Regression method	Compound annual growth rate
EIA, low oil price case	May 2010	Total capacity (GW)	SERC	2010–2030	0.30%	0.32%
IHS Global Insight	September 2009	Total capacity (MW)	ESC	2010–2030	-0.14	-0.10
IHS Global Insight	September 2010	Total capacity (MW)	ESC	2010–2030	1.82	1.62
Southeast electric utilities	Various	Total capacity (various)	Service	Various	0.72–2.69	0.60–2.50
Electricity generation						
TVA	2010	Total generation (GWh)	Service	2010–2028	0.90	0.90
EIA, reference case	December 2009	Total generation (TWh)	SERC	2010–2030	1.02	1.05
EIA, high economic growth case	May 2010	Total generation (TWh)	SERC	2010–2030	1.29	1.43
EIA, high oil price case	May 2010	Total generation (TWh)	SERC	2010–2030	1.05	1.05
EIA, low economic growth case	May 2010	Total generation (TWh)	SERC	2010–2030	0.57	0.58
EIA, low oil price case	May 2010	Total generation (TWh)	SERC	2010–2030	0.82	1.01
IHS Global Insight	September 2009	Total generation (GWh)	ESC	2010–2030	1.11	1.18
IHS Global Insight	September 2010	Total generation (GWh)	ESC	2010–2030	2.13	1.96
Southeast electric utilities	Not reported	Not reported	Not reported	Not reported	-0.21–3.01	-0.01–2.45

Sources: GAO analysis of data from TVA, EIA, IHS Global Insight, and Southeast electric utilities.

Note: ESC indicates the East South Central census region comprising the states of Alabama, Kentucky, Mississippi, and Tennessee. The SERC region indicates the geographical region overseen by the SERC Reliability Corporation (formerly the Southeastern Electric Reliability Council, Inc.).

Table 4: Time Series Data from a Nonprobability Sample of Five Southeastern Utilities

	Utility A	Utility B	Utility C	Utility D	Utility E
Vintage	2009	2009 and 2010	2009	2009	2009 and 2010
Peak demand	2010–2030 (MW)	2010–2025 (MW)	2010–2025 (MW)	2010–2030 (MW)	2010–2029 (MW)
Electricity sales	2010–2030 (MWh)	2010–2025 (MWh)	2010–2025 (MWh)	2010–2030 (MWh)	2010–2029 (GWh)
Employment	n/a	n/a	n/a	n/a	n/a
Population	2010–2030	2010–2024 (thousands)	2010–2025 (residential customers)	2010–2030	2010–2030 (thousands)
Real income per capita	Not reported	Not reported	Not reported	Not reported	Not reported
Total capacity	2010–2030 (MW)	2010–2025 (MW)	2010–2025 (MW)	2010–2030 (MW)	2010–2028 (GW)
Electricity generation	Not reported	Not reported	Not reported	Not reported	Not reported

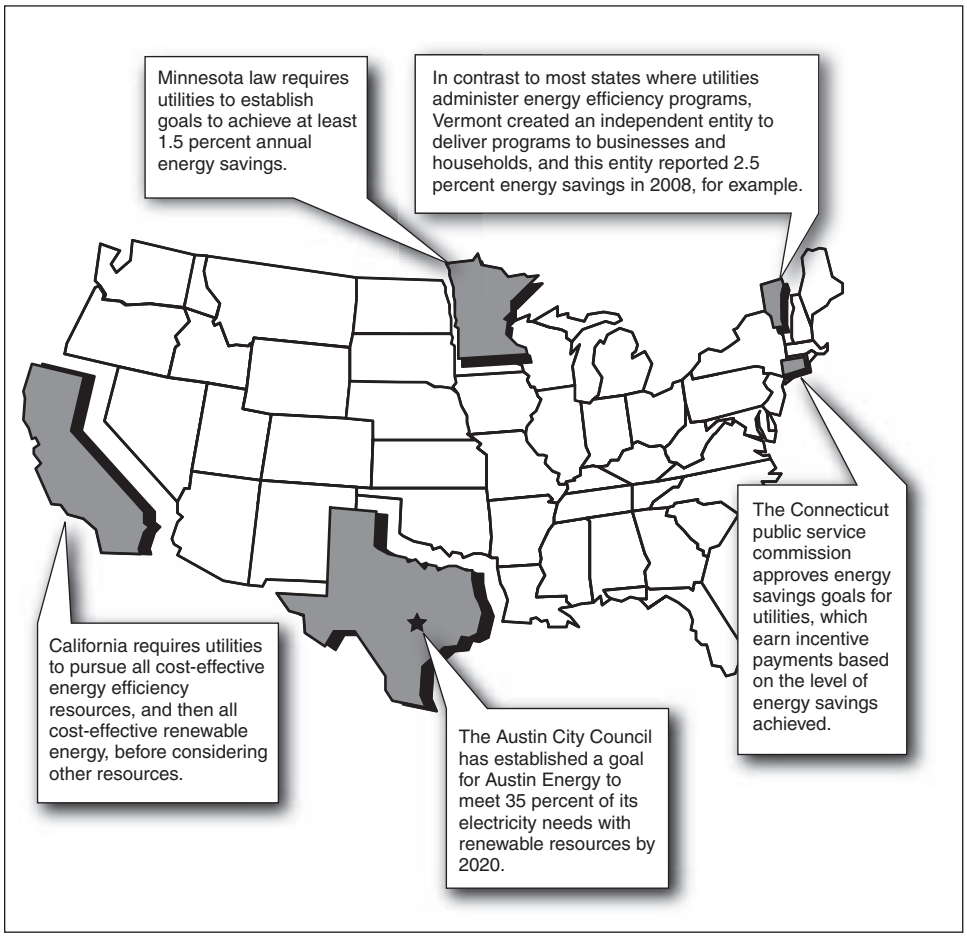
Sources: GAO analysis of data from Southeast electric utilities.

Note: We have suppressed the names of the utilities, along with descriptive information about real income per capita and electricity generation, to maintain confidentiality.

Appendix III: Examples of Mandates, Incentives, and Other Policies that Encourage Energy Efficiency and Renewable Energy

Many electric utilities around the country are encouraged to invest in energy efficiency and renewable energy projects through a variety of mandates, incentives, and policies. One important type of mandate is the renewable portfolio standard, which requires utilities to provide a certain proportion of their electricity from renewable resources. Twenty-nine states and the District of Columbia had established a renewable portfolio standard as of June 2011, according to the Department of Energy. Some states have also established Energy Efficiency Resource Standards, which require utilities to attain a certain level of energy savings. Incentives from state and federal governments can also encourage investments in energy efficiency and renewable energy by lowering the cost of these programs. Examples of policies that encourage energy efficiency and renewable energy are shown in figure 12.

Figure 12: Examples of Policies Encouraging Energy Efficiency and Renewable Energy



Sources: GAO analysis of state policies and utility responses.

Appendix IV: Comments from the Tennessee Valley Authority

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902

Tom Kilgore
President and Chief Executive Officer

September 29, 2011

Mr. Franklin W. Rusco
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

GAO DRAFT REPORT – FULL CONSIDERATION OF ENERGY EFFICIENCY AND BETTER CAPITAL EXPENDITURES PLANNING ARE NEEDED

Dear Mr. Rusco:

Thank you for the opportunity to provide the Tennessee Valley Authority's (TVA) comments on the subject report. Given the size and scope of TVA, our energy resource planning activities and financial structure are complex matters, and we commend the Government Accountability Office (GAO) for its thoughtful and thorough review.

The report contains two recommendations, which have been shared with TVA's Board of Directors. First, it recommends that TVA use the information from a study on energy efficiency potential, which is currently underway, to inform future resource planning processes. We concur with this recommendation and anticipate receiving the completed study in late 2011.

We note that the GAO report recognizes that TVA has taken steps to increase its energy efficiency programs, consistent with TVA's Vision to lead the Southeast region in increased energy efficiency. TVA sees the opportunity for considerable progress in energy efficiency and demand response (EEDR) across our service territory, and we are moving forward to take advantage of that opportunity.

Since GAO began this audit in January 2010, TVA has expanded both its programs and investment in EEDR in fiscal years 2010 and 2011. In FY 2010, TVA invested nearly $91 million and achieved 210 GWh of energy efficiency savings. In FY 2011, the budget is $135 million, and we expect to achieve over 500 GWh of savings. We will continue to grow this resource, and the TVA Board recently approved a budget of approximately $190 million in FY 2012 for EEDR.

TVA's energy efficiency strategy includes incentive programs, price structure changes and education to raise awareness and to encourage smart consumer choices. TVA offers energy efficiency programs through participating power distributors under the brand of Energy Right

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Solutions for Home, Business and Industry. Since 2009, over 25,000 in-home audits have been performed by TVA-certified energy auditors through TVA's In-Home Energy Evaluation program. This program has surpassed its FY 2011 goal of 12.1 GWh savings, achieving 14.8 GWh by the end of August. In addition, TVA's Business program has surpassed its FY 2011 goal of 90.5 GWh savings, achieving 100.7 GWh by August. TVA's demand response programs continue to provide system and economic benefits with a total of 223 MW of power reduction commitments on 693 customer sites across the Valley.

Two significant projects will be completed in the near future. The first is the study referenced in the GAO report, a bottom-up potential study with Global Energy Partners to determine energy efficiency potential at a program-by-program level. TVA expects to receive the report soon, and will then undertake a careful evaluation of its findings. In addition, we are developing a five-year action plan for EEDR, which we also expect to complete in late 2011.

TVA commissioned its study on energy efficiency potential to use the results to guide and inform our further planning for energy efficiency programs. The flexibility which TVA has currently built into our energy resource planning process will allow us to consider the study's results in our ongoing and future programs and goals.

While the upcoming study will be an important tool for our efforts, TVA had previously used other regional studies over the past five years in the development and design of its current programs. In early 2010, a study was completed by the Electric Power Research Institute, which helped to form the basis for one of the EEDR portfolio options analyzed in TVA's Integrated Resource Plan.

We also appreciate GAO's recognition that TVA's resource planning process and load forecasts are consistent with other utilities and entities. With regard to any concern about the impacts of TVA's planning process on its energy efficiency programs, TVA studied five EEDR portfolios in its Integrated Resource Plan. The planning model itself does not make a determination of the most cost-effective individual efficiency programs. TVA does have a process in place to screen programs for total resource cost and utility cost prior to constructing the efficiency portfolios. As a prudent utility practice, models are excellent tools to inform expert judgment. However, the planning process must also include business expertise and strategic recommendations from knowledgeable planners.

To further demonstrate our commitment to grow TVA's energy efficiency programs and to further educate stakeholders on the importance of energy efficiency, TVA will host a two-day forum in February 2012 in Nashville, Tennessee. The forum's topics will include TVA's five-year action plan, market transformation, and energy efficiency as a tool for economic recovery and job growth in the region, to name a few.

Second, the report recommends that TVA develop a written plan for its capital expenditures, including the manner in which it will fund these expenditures. TVA agrees that it is important for utilities to have a well-developed capital expenditure plan, and our current plan tracks with our Vision to be one of the nation's leading providers of low-cost and clean energy by 2020. TVA's

Vision is the foundation for the processes we use to set the long-range financial plan, determine what generation assets are needed, develop a three-year budget cycle, and ultimately, to make recommendations to the Board for each fiscal year's capital expenditures.

Currently, TVA utilizes several formal processes to develop its long-range plans, including its capital expenditure plans.

- TVA's power supply plan, which serves as the foundation for TVA's budget and long-range financial plan, sets forth a detailed plan for generation expansion to meet the needs of its customers at the lowest feasible cost.
- Each year as part of its annual business planning process, TVA develops detailed budget plans that include the rate actions and financing needed to execute TVA's business plans. The Board approves the next fiscal year and also reviews a three-year plan. This plan also serves as the basis for TVA's budget submittals in the President's budget each year.
- TVA also prepares a 10-year Long-Range Financial Plan, which serves as the basis for guiding TVA's long-term financial needs and considers long-term asset decisions.
- As the report notes, TVA employs a set of Financial Guiding Principles in its financial planning activities, including how it funds capital expenditures. These principles are based on prudent utility and financial practices.
- As one of its standard programs and processes, TVA utilizes a project justification process, which is designed to ensure that projects are aligned with TVA's Vision, goals and strategic objectives.

TVA has a number of interrelated and carefully coordinated planning processes for capital expenditures. We understand your recommendation that TVA develop a written capital planning expenditure plan to be a suggestion that TVA more formally integrate these various processes. More formal integration has the potential to promote greater effectiveness in the financial planning processes, and TVA is continuously working to refine and improve these processes.

Electric utilities are a capital-intensive industry, and the industry as a whole is expected to spend $80 billion a year over the next decade in capital investments. In order to meet TVA's Vision to be one of the nation's leading providers of low-cost and cleaner energy by 2020, TVA will need to have financial flexibility for sufficient access to capital to make long-term investments in the most efficient, economical, and responsible manner.

We appreciate GAO's acknowledgement that TVA's debt load is not out of line with other southeastern utilities when equity is also taken into account. TVA's $30 billion borrowing authority has not been changed since 1979, while TVA's assets have grown from $13 billion to $43 billion and sales have grown 47 percent, from 118 billion kWh to 174 billion kWh in 2010.

For over 78 years, TVA's mission has been to improve the quality of life in the Tennessee Valley region through its work in energy, environmental stewardship and economic development. TVA supplies reliable, affordable power to the region, while managing the natural resources of the Valley, including the Tennessee River system and associated public lands. As a catalyst for sustainable economic development, TVA works with its partners to recruit and retain good jobs for the region.

Thank you for the opportunity to review the report and provide comments. Once again, we appreciate GAO's detailed study of these important matters.

Sincerely,

Tom Kilgore

Tom Kilgore

Appendix V: GAO Contacts and Staff Acknowledgments

GAO Contacts

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Staff Acknowledgments

Other key contributors to this report were Ernie Hazera, Philip Farah, and Chanetta Reed, Assistant Directors; Aaron Shiffrin; Steve Lowery; David Messman; Peter Beck; Ardith Spence; and Russell Burnett. Important contributions were also made by Barbara Timmerman, Ben Shouse, and Kiki Theodoropoulos.

Related GAO Products

Tennessee Valley Authority: Plans to Reduce Debt While Meeting Demand for Power. GAO-06-810. Washington, D.C.: August 31, 2006.

Tennessee Valley Authority: Information on Lease-Leaseback and Other Financing Arrangements. GAO-03-784. Washington, D.C.: June 30, 2003.

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