United States General Accounting Office

GAO

Report to Congressional Requesters

August 1995

TENNESSEE VALLEY AUTHORITY

Financial Problems Raise Questions About Long-term Viability

GAO/AIMD/RCED-95-134

GAO

United States
General Accounting Office
Washington, D.C. 20548

B-259411

August 17, 1995

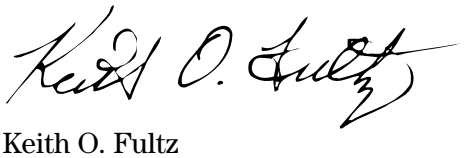
Congressional Requesters

As requested, this report presents the results of our review of the Tennessee Valley Authority's (TVA) financial condition. Our report provides information and analyses on the implications of TVA's financial condition for TVA and the federal government in light of the increasingly competitive electric utility market. This report discusses several options available for TVA and congressional decisionmakers in deciding what types of financial and other changes may be needed to protect the interests of all those, including the taxpayer, who have a stake in TVA's future.

As arranged with your offices, unless you publicly announce the contents of this report earlier, we will not distribute it until 7 days from the date of this letter. At that time, we will send copies to appropriate House and Senate committees, interested Members of the Congress, the Chairman of TVA's Board of Directors, the Director of the Office of Management and Budget, and other interested parties. We will also make copies available to others upon request.

This report was prepared under the direction of Lisa Jacobson, Director, Civil Audits in the Accounting and Information Management Division, who may be reached at (202) 512-9508, and Victor S. Rezendes, Director of Energy and Science Issues in the Resources, Community, and Economic Development Division, who may be reached at (202) 512-3841, if you have any questions. Major contributors to this report are listed in appendix VI.

Gene L. Dodaro
Assistant Comptroller General
Accounting and Information
Management Division



Keith O. Fultz
Assistant Comptroller General
Resources, Community, and
Economic Development Division

List of Requesters

The Honorable Bud Shuster
Chairman
The Honorable Norman Y. Mineta
Ranking Minority Member
Committee on Transportation and Infrastructure
House of Representatives

The Honorable John R. Kasich
Chairman
Committee on the Budget
House of Representatives

The Honorable Howell Heflin
United States Senate

The Honorable Trent Lott
United States Senate

The Honorable Bob Clement
House of Representatives

The Honorable Bud Cramer
House of Representatives

The Honorable John J. Duncan, Jr.
House of Representatives

The Honorable James H. Quillen
House of Representatives

The Honorable Zach Wamp
House of Representatives

Executive Summary

Purpose

The Tennessee Valley Authority (TVA), established in 1933 as a multipurpose, independent, government-owned corporation, is one of the nation's largest utilities. In March 1994, the Subcommittee on Investigations and Oversight of the House Committee on Public Works and Transportation held a hearing on TVA that raised concerns about TVA's nuclear program and its financial condition—including the growth of TVA's debt toward the $30 billion ceiling established by the Congress in 1979. At the request of several Members of the Congress, GAO examined the implications for TVA and possibly the federal government of TVA's financial condition in light of the increasingly competitive electric utility market. More specifically, this report presents information on TVA's financial condition compared with neighboring utilities, power resource decisions, competitive prospects in the short term, and options for addressing TVA's problems.

Background

TVA is a unique federal corporation that supplies electricity and develops resources to serve more than 7 million people in an 80,000-square-mile area covering Tennessee and parts of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia.

TVA's multibillion-dollar power program, which generated about $5.4 billion in 1994 revenues, is required by the Tennessee Valley Authority Act to be self-supporting from power revenues. TVA issues bonds to provide most of the financing needed to construct its power facilities. Under section 15d of the TVA Act, these bonds are not guaranteed by the federal government. However, the financial community views them as having an implicit federal guarantee. Existing legislation also gives TVA a great deal of independence in deciding how it is to be operated and managed. TVA's three-member Board of Directors has the sole authority to set electricity rates for its 160 distributors and decide what kinds of power plants to build.

Because of protections provided in legislation and contracts with its distributors, TVA generally has not had to compete with other utilities. TVA has recently acknowledged through its actions and announcements that it will have to compete in the future. In addition, industry experts have stated that TVA's service area cannot remain isolated from competition.

Results in Brief

TVA is $26 billion in debt and has invested $14 billion in nonproducing nuclear assets (called "deferred assets") that are not included in its

electricity rates. As a result, TVA has far more financing costs and deferred assets than its likely competitors have, which gives TVA little flexibility to meet competitive challenges. To the extent that TVA cannot compete effectively and improve its financial condition, the federal government is at risk for some portion of TVA's debt.

TVA's troubled financial condition has been largely caused by construction delays, cost overruns, and operational shutdowns in its nuclear program. Because TVA has excluded the costs of its nonproducing nuclear assets from its electricity rates for a long period, its current rates are too low to recover all relevant costs. To complete its nuclear construction activities and modernize its coal and hydroelectric plants, TVA will have to spend billions of dollars more, adding further pressure to increase electricity rates.

TVA's links to the federal government and its high debt limit have enabled it to borrow the billions of dollars needed for its nuclear construction program. TVA's electricity rates and power production decisions are not subject to the same oversight that other utilities routinely face. Although protected from competition by legislation and its customer contracts in the short run, TVA will have to compete with other utilities in the long run. Because of its heavy debt burden and resultant high financing costs, TVA lacks the flexibility to successfully compete in this environment.

While no cash-flow crisis exists today, GAO believes that TVA's financial condition threatens its long-term viability and places the federal government at risk. Resolving TVA's financial problems will be costly and require painful decisions. GAO is highlighting several options that could reduce risk to federal taxpayers and help prepare TVA to compete in the electricity market.

GAO's Analysis

TVA's Financial Condition Puts It at a Competitive Disadvantage

Compared with neighboring utilities, TVA's financial condition—especially its high financing costs and deferred assets—places it at a competitive disadvantage. For example, TVA's high debt resulted in its paying $1.9 billion, or 35 percent of its power revenues in 1994, for financing costs. Similar expenses for TVA's neighboring utilities averaged only 16 percent of revenues. Furthermore, 69 percent of TVA's $28 billion of net

property, plant, and equipment was related to the nuclear program, which generated only 14 percent of TVA's electricity in 1994. In contrast, only 19 percent of these assets were related to TVA's coal and hydroelectric programs, which generated almost 86 percent of TVA's electricity.

Among other factors, TVA's decisions to defer from its electricity rates the costs for nonproducing nuclear assets that do not generate electricity or produce revenue have permitted TVA to maintain stable electricity rates since 1988. When these costs are recognized, pressure to increase TVA's rates appears likely, despite recent management steps to reduce TVA's operating costs. These steps, including a substantial reduction in employees and refinancing of debt, leave little room for TVA to further reduce its controllable costs. TVA has recognized the problems created by high debt. In December 1994, TVA announced plans to limit its debt to about $2 billion to $3 billion below the $30 billion ceiling and to reach this limit by the end of fiscal year 1997.

In contrast to TVA, neighboring utilities have far less financing costs and deferred assets. These two factors provide neighboring utilities with greater flexibility to meet price competition. For example, in 1994, TVA's ratio showing costs deferred from current rates to be recouped in the future was more than 15 times higher than the average ratio for neighboring utilities. Furthermore, despite having excluded its deferred assets, TVA's rates, while low, are not the lowest compared to neighboring utilities.

TVA's Power Resource Decisions Increase Financial, Operating, and Competitive Risks

TVA's nuclear power program has had a long history of construction and operating problems. For example, one unit currently under construction—Watts Bar 1—is expected to cost $6.8 billion at completion and has been under construction for over 22 years. Another unit—Browns Ferry 3—went into commercial service in 1977, was shut down in 1985, and is not expected to be restarted until 1996. Furthermore, the total estimated costs to bring Watts Bar 1 and Browns Ferry 3 into commercial operation increased about $1.6 billion and $1.2 billion, respectively, between fiscal years 1990 and 1994. In addition, TVA has $6.2 billion in deferred assets associated with three nuclear units that are currently in a "mothballed" status.

Because of changing market conditions and uncertain levels of demand for electricity, many utilities are investing in alternative power resource options. Many other utilities are planning to meet their future power needs

by building lower cost natural gas fired units or purchasing power from outside sources. During fiscal year 1994, TVA spent $2 million a day at Watts Bar 1 and Browns Ferry 3. TVA also anticipates spending from $240 million to $301 million annually (in constant 1994 dollars) for the next 26 years to upgrade its aging coal and hydroelectric plants. TVA will continue to rely on these coal and hydroelectric plants to produce most of its electricity. Further delays and cost overruns at its nuclear units could limit funds available for needed improvements to these plants.

TVA's Competitive Prospects Are Protected in the Short Run

Although TVA's financial condition is troubled, in the short run TVA is protected from the pressures of competition. For example, in nearly all instances, contracts with TVA's 160 distributors require that a 10-year notice be given before they can switch to another power company. Also, TVA is not required under existing legislation to allow other utilities to use its transmission lines to provide service to TVA's customers.

However, even these protections do not guarantee that TVA will remain isolated from competition. For instance, because they are concerned about potential rate increases, some of TVA's distributors have solicited and received bids to buy power from other suppliers. Furthermore, industrial representatives said that TVA needs to reduce its rates to be competitive with the low-cost utilities in the region.

An April 1995 report commissioned by TVA concluded that TVA is well-positioned to meet competitive challenges because its financial condition is sufficiently flexible and strong. The report recommended a phased approach to remove legislative restrictions so TVA could become fully competitive.

While agreeing that TVA will have to compete in the future, GAO disagrees that TVA's financial condition will allow it to compete successfully. Furthermore, GAO disagrees that removing existing legislative protections would make TVA more competitive at this time. On the contrary, these protections keep TVA from being placed in a position where competition could adversely affect its long-term financial viability.

Options for Addressing TVA's Problems

TVA has taken various actions and has announced other plans to reduce its costs and limit its debt to make itself more competitive. However, GAO does not believe that these actions will be sufficient in the long term to adequately protect the interests of federal taxpayers and enable TVA to

meet competitive challenges. TVA does not face a cash-flow problem today only because it has nearly $4 billion of remaining borrowing authority.

A number of options are available to address TVA's financial problems. For example, TVA could raise rates. With the additional cash generated from operations, TVA could reduce its borrowing or pay down its debt; however, this course of action would make TVA's rates less competitive, thus aggravating its long-term financial health.

The Congress also has a broad range of options. For example, the Congress could allow TVA to continue to try and work the problems out on its own, remove statutory barriers to competition, or privatize TVA. Each of these options would involve tradeoffs. The Congress could also forgive TVA's federal debt or restructure some or all of its debt so that TVA repays at a lower interest rate. These options would have a negative impact on the federal deficit. And the Congress could subject TVA to greater management oversight by requiring that its rates and resource decisions be reviewed and approved by an external body, or by expanding its Board to include a broader spectrum of interests.

These and other options that are discussed in this report are not intended to suggest a specific course of action but rather to provide a basis for discussion on how to protect the interests of everyone who has a stake in TVA's future.

Agency Comments

TVA strongly disagreed with GAO's assessment in many areas. TVA officials stated that TVA is a financially healthy corporation that is well able to service its debt now and in the future. TVA officials further stated that it has made the tough decisions necessary to prepare for the coming era of deregulation and competition in the utility industry.

GAO agrees that TVA has taken a number of actions in recent years to improve its financial position, including downsizing its work force and refinancing its debt at lower interest rates. These actions, however, do not significantly diminish the financial problems identified in this report that raise questions about TVA's long-term viability. As a result, GAO continues to believe that TVA has little flexibility to meet the competitive challenges that lie ahead; and to the extent that TVA cannot compete effectively and improve its financial condition, the federal government is at risk for some portion of TVA's debt. For these reasons, GAO continues to believe that a dialogue is needed among the key decisionmakers concerning options

available to better protect the government's interests and help TVA fulfill its announced intention of becoming a competitive and financially viable utility.

TVA's written comments are presented in appendix IV, and GAO's responses are discussed in chapter 5 and appendix IV.

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Abbreviations

COMMEND	Commercial End-Use Energy Planning System
DOE	Department of Energy
DRI	Data Resources, Inc.
EFM	Electricity Forecasting Model
ELCON	Electricity Consumers Resource Council
FERC	Federal Energy Regulatory Commission
FFB	Federal Financing Bank
FINESSE	financial model
GAAP	generally accepted accounting principles
GAO	General Accounting Office
HELM	Hourly Energy Load Model
INFORM	Industrial Energy End-Use Model
IPP	independent power producer
IOU	investor-owned utility
IRP	integrated resource plan
kwh	kilowatt hour
MW	megawatt
NRC	Nuclear Regulatory Commission
PP&E	property, plant, and equipment
REEPS	Residential End-Use Energy Planning System
RESM	Regional Economic Simulation Model
SFAS	Statement of Financial Accounting Standards
TVA	Tennessee Valley Authority
TVPPA	Tennessee Valley Public Power Association

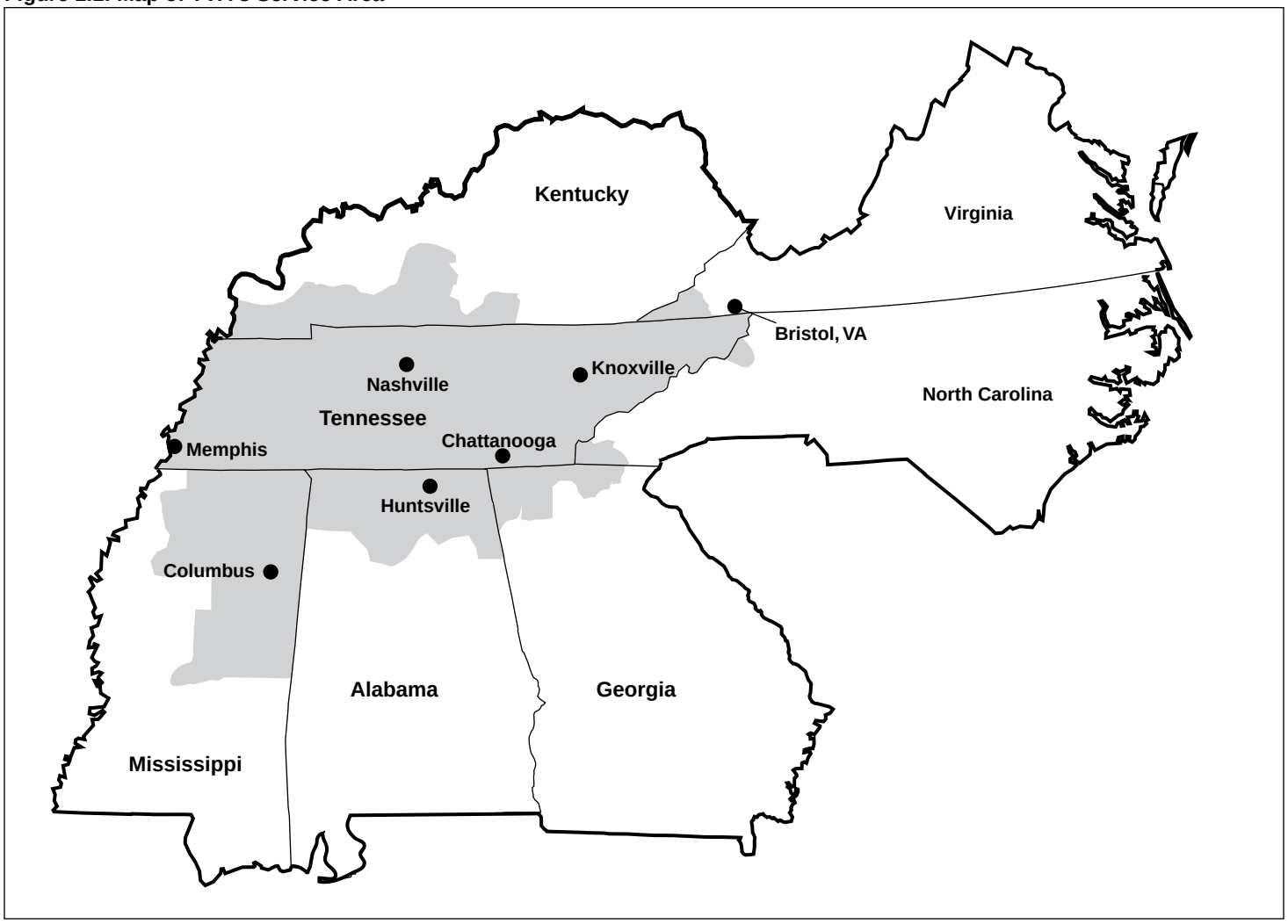
Introduction

The Tennessee Valley Authority (TVA) is a multipurpose, independent, federal corporation established by the Tennessee Valley Authority Act of 1933. The act established TVA to improve the quality of life in the Tennessee River Valley by improving navigation, promoting regional agricultural and economic development, and controlling the flood waters of the Tennessee River. To those ends, TVA erected dams and hydroelectric power facilities on the Tennessee River and its tributaries.

To meet the need for more electric power during World War II, TVA expanded beyond hydropower, building coal-fired power plants. In the 1960s, TVA decided to add nuclear generating units to its power system. Today, TVA operates one of the nation's largest power systems, with a dependable capacity in service of about 26,000 megawatts (MW).[1] The system consists primarily of 113 hydroelectric units, 59 coal-fired units, and 3 operating nuclear units. TVA sells power in seven states—Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia—as illustrated in figure 1.1.

[1]A megawatt is one million watts of electricity.

Figure 1.1: Map of TVA's Service Area



Source: TVA 1994 Annual Report.

TVA sells power at wholesale rates to 160 municipal and cooperative distributors and to a number of directly served large industrial customers and federal agencies. These distributors, in turn, sell the power on a retail basis to more than 7 million people in an 80,000 square mile region. TVA had about 19,000 employees on September 30, 1994. TVA's power program generated about $5.4 billion in 1994 revenues, with about $4.6 billion of this amount coming from the 160 distributors.

TVA's programs are divided into two types of activities—the nonpower programs and the power program. The nonpower programs, such as water resources, navigation, and flood control, are primarily funded through federal appropriations and user fees. These programs received about $140 million in funding in fiscal year 1994 and are operated primarily within the 41,000 square mile Tennessee River watershed. TVA's power program is included in the federal budget as a public enterprise revolving fund called the TVA Fund. Revolving funds are generally intended to be self-supporting, such that their operating expenses are paid for by operating revenues.

Authorizing Legislation Established TVA as a Wholly-Owned Government Corporation

TVA's authorizing legislation allows it to operate with a high degree of independence. The TVA Act of 1933 did not subject TVA to the regulatory and oversight requirements that must be satisfied by other power administrations or electric utilities. For example, unlike other utilities, the rates TVA charges for its electric power and its power resource decisions are not subject to review and approval by state public utility commissions or the Federal Energy Regulatory Commission (FERC).

Under existing legislation, FERC is primarily responsible for (1) regulating rates, terms, and conditions for the sale and transmission of electricity sold at wholesale in interstate commerce, (2) regulating mergers, dispositions, and acquisitions of facilities used for the transmission of electricity in interstate commerce or the sale of wholesale power in interstate commerce (referred to as jurisdictional facilities), and (3) authorizing the issuance of securities in those instances where states do not regulate them. Existing legislation requires that rates for wholesale electric energy sales and for the transmission of electric energy in interstate commerce be "just and reasonable," without undue preferences or advantages to buyer or seller. State public utility commissions are primarily responsible for approving retail electricity rates and resource decisions for utilities under their jurisdiction.

In recent years, both federal and state regulators have acted to promote competition in wholesale electricity markets. For example, FERC has approved wholesale electricity rates that were market based (determined through a competitive or negotiated process between the purchasing utility and the potential supplier). Previously, FERC generally approved rates only if they were cost based (based on the seller's cost of supplying power).

As opposed to the regulatory environment faced by other utilities, all authority to run and operate TVA is vested in TVA's three-member Board of Directors, including the sole authority to set wholesale electric power rates and approve the retail rates charged by TVA's distributors.[2] The three board members are full-time employees of TVA. They are appointed by the President, with the advice and consent of the Senate, and serve 9-year, overlapping terms of office. The President designates one member as the chairman.

The issue of TVA's oversight has been examined several times in the past. For example, in a 1982 report, we pointed to a growing concern with TVA activities and identified options for improving oversight and accountability.[3] These options included periodic congressional oversight hearings and/or placing the TVA rate-setting process under FERC. In a 1983 report, we reported on our concerns about TVA's management and concluded that the issue of the adequacy of TVA's oversight needed greater attention.[4] In a 1987 report entitled "TVA—A Path to Recovery," the Southern States Energy Board[5] concluded that "...additional mechanisms are needed to ensure that TVA is accountable for its actions to its ratepayers, Congress, and the American public." The report further stated that "There must be a fundamental change in TVA's structure to effectively respond to today's challenges and meet the necessary standards of accountability. A larger Board should be established, comprised of part-time directors who would be responsible for policy-making and oversight of TVA's management."

In 1959, the Congress amended the TVA Act to authorize the use of debt financing to pay for capital improvements for power programs. Under this legislation, the Congress required that TVA's power program be "self-financing" through revenues from electricity sales. For capital needs in excess of internally generated funds, TVA was authorized to borrow by issuing bonds. TVA's debt limit is set by the Congress and was established at $750 million in 1959. Since then, TVA's debt limit has been increased four

[2]TVA is subject to some other regulatory actions, such as the Nuclear Regulatory Commission's (NRC) role in licensing and inspecting nuclear facilities and the Environmental Protection Agency's environmental regulations.

[3]Tennessee Valley Authority—Options for Oversight (GAO/EMD-82-54, Mar. 19, 1982).

[4]Triennial Assessment of the Tennessee Valley Authority—Fiscal Years 1980-1982 (GAO/RCED-83-123, Apr. 15, 1983).

[5]The Board was comprised of government and industry experts with diverse experience in energy operations, management, and regulation.

times by the Congress: to $1.75 billion in 1966, $5 billion in 1970, $15 billion in 1975, and $30 billion in 1979.

The 1959 amendments to the TVA Act also protected surrounding utilities from competition with TVA because it was a low-cost federal utility. By establishing what is commonly referred to as the "TVA fence," the 1959 act prohibited TVA—with some exceptions—from entering into contracts to sell power outside the service area TVA and its distributors were serving on July 1, 1957. TVA was allowed to sell power to other utilities outside of its service area if the power is surplus to the requirements of TVA's own customers. TVA can also buy power when needed.

Legislative Changes Create a Competitive Electricity Market for Other Utilities

Historically, investor-owned utilities (IOU) and other electricity providers have operated as regulated monopolies. Under traditional utility regulation, electric utilities' rates and investments in generation, transmission, and distribution facilities were regulated by state public utility commissions. Under these arrangements, IOUs were required to provide electric service to all customers within their power service areas. In exchange, they received exclusive service areas. To serve their customers, utilities could incur costs for building new generating plants and operating the power system. IOUs generally recoup these costs plus a regulated return through their electricity rates.

In the last 25 years, laws have encouraged the creation of a competitive market. The Public Utilities Regulatory Policies Act of 1978 facilitated the creation of small (less than 80 MW of capacity) electricity generators that were exempt from many state and federal regulations. Called "nonutility generators" or "independent power producers" (IPP),[6] these entities typically used new technologies to generate power, such as cogenerating plants[7] or small natural gas fired generation units. According to the National Independent Energy Producers,[8] by the end of 1994, these entities accounted for about 51,000 MW of capacity in the United States (or about 6 percent of total capacity in the nation)—directly competing with

[6]IPPs, which are firms that produce electric power to be sold at wholesale rates, are not considered utilities because they do not produce power for a service area and do not engage in transmitting or distributing power.

[7]The cogeneration of power involves the use of steam, waste heat, or resultant energy from a commercial or industrial plant or process for generating electricity.

[8]National Independent Energy Producers is a trade association representing many nonutility generators of electricity and IPPs.

utility-owned capacity and placing downward pressures on electricity rates.

Today, many IPPs pose a threat to IOUs, in part because IPPs can establish generation facilities near large industrial and municipal customers and sell power to these customers for a lower rate than the established utility. For example, in upstate New York, an IPP is building a 1,000 MW cogeneration plant next to two industrial plants, thereby luring away from the established utility one of its largest customers as well as a smaller one. The IPP plans to sell 65 MW to the two industrial customers and its remaining power to other utilities.

The Energy Policy Act of 1992 promoted increased competition in the electricity market. The act encouraged open transmission of electricity by allowing wholesale electricity customers, such as municipal distributors, to purchase electricity from any supplier, even if that power must be transmitted over lines owned by another utility—referred to as wheeling of power.[9] Under the act's provisions, FERC can compel a utility to transmit electricity generated by another utility into its service area for resale. However, the act protects TVA from the new wheeling requirements by preventing competitors from using TVA's transmission system to sell to customers inside TVA's service area. In addition, the act required TVA to conduct a least-cost planning program—also referred to as an integrated resource plan (IRP). For further information about TVA's ongoing IRP process, see appendix I.

Electricity markets are becoming more competitive and, as a result, FERC expects wholesale and retail electricity rates to drop. For example, according to Virginia Power officials, a subsidiary of American Electric Power offered to sell electricity to a rural electric cooperative in Virginia—a wholesale customer of Virginia Power. To retain this business, Virginia Power cut its rates by over 5 percent. State regulators are now exploring opportunities to make retail markets competitive. Several states, including California, Michigan, and Washington, are exploring whether to introduce "retail wheeling"—a concept under which end-use customers will choose the utility that provides them with electric power, much like consumers today choose a long distance telephone company.

While TVA is currently exempt from wheeling requirements and has other barriers to protect it from competition in the short term, it has recently

[9]Wheeling of power refers to the use of a utility's transmission system when the power is being bought and sold by parties other than the transmitting utility. Fees are paid to the transmitting utility for use of its system.

acknowledged through its actions and announcements that it will have to compete in the future. Industry experts and representatives of TVA's customers have also stated that TVA's service area cannot remain isolated from competition over the long run.

History of TVA's Nuclear Power Program

TVA made its commitment to nuclear power in the late 1960s and early 1970s, when power sales were growing at a steady rate and were expected to double every 10 years. In the Tennessee Valley, the number of electricity customers rose to over 2 million in the 1960s and about 30 percent of all the homes were heated with electricity. By 1970, TVA customers used nearly twice as much electricity as the national average. At that time, TVA was experiencing an annual growth rate of about 8 percent in demand for electricity, and TVA's forecasts through the mid-1970s were showing continued high growth in demand.

TVA believed, along with many in the utility industry, that new generating capacity was needed to satisfy its forecast demand. To meet that need and lessen the environmental problems associated with its coal plants, TVA embarked on a highly ambitious nuclear power plant construction program. In 1966, TVA announced plans to build 17 nuclear units at seven sites in Tennessee, Alabama, and Mississippi. In 1967, it started building the nation's largest nuclear power facility—Browns Ferry in north Alabama.

However, instead of increasing, electricity consumption declined in the mid-1970s following the 1973 energy crisis and again in the late 1970s and 1980s as a result of higher energy costs and lower economic growth. Also, in 1975, after an electrical insulation fire damaged the Browns Ferry plant and again in 1979 after the Three Mile Island nuclear accident, NRC issued extensive new safety regulations that applied to all plants, including those under construction or in operation. The decreasing demand for electricity, coupled with the increased regulation surrounding nuclear power, caused the electric utility industry to rethink the role that nuclear power would play in meeting the nation's demand for electricity.

By the early 1980s, most utilities had chosen to cancel ongoing or planned nuclear plants. After reassessing its forecast demand using a more sophisticated methodology, TVA began scaling back its nuclear plans by canceling 8 of its 17 planned nuclear units in 1982 and 1984 after investing

almost $5 billion[10] in the 8 units. The costs associated with these plants were written off over 10 years and recovered through rates.

TVA's nine remaining nuclear units have had a long history of operating and construction problems. The status of these units as of March 1, 1995, was as follows:

- Three units were operational: Browns Ferry 2, Sequoyah 1, and Sequoyah 2.
- Two units were actively under construction: Watts Bar 1 has been under construction for 22 years and has not yet operated. Browns Ferry 3 began operations in 1977, but was shut down in 1985 because of repeated operational and maintenance errors.
- Four units were in a "mothballed" status: Browns Ferry 1 was shut down because of ineffective management and technical deficiencies. Construction has been suspended indefinitely on Watts Bar 2, Bellefonte 1, and Bellefonte 2. TVA plans to maintain these units in their present status until completion of its IRP in late 1995. At that time, it will consider such alternatives as (1) converting the units to another technology such as natural gas, (2) replacing them with different types of supply- and demand-side resource options, (3) completing the construction of one or more units as nuclear plants in partnership with others, or (4) maintaining them in a mothballed state pending a later decision.

Today, TVA is the only utility in the nation actively constructing nuclear power plants. To date, its investment in nuclear units has totaled about $25 billion, of which about $5 billion has been spent on units that are now operating. Table 1.1 summarizes the current status of TVA's nuclear program.

[10]Unless noted otherwise, amounts in this report are in current-year dollars.

Table 1.1: Status of TVA's Originally Planned 17 Nuclear Units as of July 1995

Nuclear plants/units	Year construction started	Year commercial service began	Current status
Browns Ferry			
unit 1	1967	1974	shutdown[a]
unit 2	1967	1975	operating
unit 3	1968	1977	construction[b]
Sequoyah			
unit 1	1970	1981	operating
unit 2	1970	1982	operating
Watts Bar			
unit 1	1973	1996[c]	construction
unit 2	1973	none	unfinished[a]
Bellefonte			
unit 1	1974	none	unfinished[a]
unit 2	1974	none	unfinished[a]
Phipps Bend			
unit 1	1977	none	cancelled 1982
unit 2	1977	none	cancelled 1982
Hartsville			
A units 1&2	1976	none	cancelled 1984
B units 1&2	1977	none	cancelled 1982
Yellow Creek			
unit 1	1978	none	cancelled 1984
unit 2	1978	none	cancelled 1984

[a]Considered to be in "mothballed" status.

[b]Browns Ferry unit 3 was originally opened in 1977 and shut down in 1985. TVA plans to have the unit in full commercial operation by February 1996.

[c]TVA's estimated date of commercial operation is February 1996.

Source: GAO analysis of TVA data.

Objectives, Scope, and Methodology

On March 9, 1994, the Subcommittee on Investigations and Oversight of the House Committee on Public Works and Transportation held an oversight hearing on TVA. The hearings focused on TVA's nuclear power program, debt level, load forecasting, and resource planning process. During these hearings, concerns were expressed about TVA's ability to construct and operate its nuclear units reliably, the impact of TVA's debt on its rates and competitiveness, and the accuracy of TVA's load forecasts.

Because of concerns raised during and after the March 1994 hearing, several Members of the House and Senate requested that we undertake an examination of TVA. On the basis of subsequent briefings and meetings

with the requesters' offices, we agreed to examine the implications for TVA and possibly the federal government of the financial issues facing TVA in light of the increasingly competitive electric utility market.

In this report, we present information and analyses on (1) TVA's financial condition compared with neighboring utilities (in chapter 2), (2) TVA's power resource decisions (in chapter 3), (3) TVA's short-term competitive prospects (in chapter 4), and (4) options for addressing TVA's problems (in chapter 5). In response to other issues raised, we also discuss TVA's integrated resource planning process in appendix I, its past and present load forecasting methodologies in appendix II, and its use of in-substance defeasance to refinance debt in appendix V. Additional information on our objectives, scope, and methodology, including a listing of the various organizations and groups we contacted, is contained in appendix III.

Where possible, we used audited fiscal year 1994 financial data for TVA and the neighboring utilities. We conducted our review between June 1994 and July 1995 in accordance with generally accepted government auditing standards. We requested written comments from the chairman of the Tennessee Valley Authority or his designee. TVA provided written comments on a draft of this report. These comments are reprinted in appendix IV.

TVA's Financial Condition Will Make It Difficult to Compete

As of September 30, 1994, TVA had about $26 billion of total debt. This debt resulted in TVA paying $1.9 billion in financing costs,[1] which represented 35 percent of its revenues in fiscal year 1994. At the same time, $14 billion of nonproducing nuclear assets[2] have not been included in TVA's revenue requirements[3] and are thus excluded from current rates. Inclusion of these costs in future revenue requirements will likely increase TVA's rates.

TVA's financing costs and deferred assets[4] place it at a competitive disadvantage when compared to the financial condition of surrounding IOUs. IOUs have substantially less financing costs and deferred assets than TVA. These factors provide the surrounding IOUs with greater flexibility to meet rate competition. Despite having excluded its deferred assets from current rates, TVA's rates are not the lowest when compared with these surrounding IOUs.

TVA Has Substantial Debt and Significant Costs for Nonproducing Nuclear Assets

TVA has financed its large nuclear investment primarily by issuing debt (borrowing). Current rates must recover the substantial amount of annual interest on this debt, including the portion related to TVA's nonproducing nuclear assets. In addition, we estimate that TVA's $14 billion of nonproducing nuclear assets will increase its future revenue requirements by at least 9 percent.

Large Investment in Nuclear Power Assets

On the basis of historic costs reflected in TVA's balance sheets, since its construction program began in 1966, TVA has spent over $25 billion on nuclear assets. This includes the costs of eight cancelled nuclear plants that were previously written off, along with all other nuclear costs on TVA's balance sheet as of September 30, 1994. As stated in chapter 1, only 3 of the planned 17 units are currently operating.

[1]Financing costs include interest expense on short- and long-term debt, interest on appropriation investment (TVA only), and dividends on preferred and common stock (IOUs only). Since TVA does not issue stock, its financing costs consist of interest charges only. Preferred and common stock dividends were included in the IOUs' financing costs to reflect the difference in the capital structure of these entities and TVA.

[2]TVA's nonproducing nuclear assets include investment in nuclear units that are recorded in the construction in progress and deferred nuclear units accounts on TVA's balance sheet. These units neither generate electricity nor produce revenue.

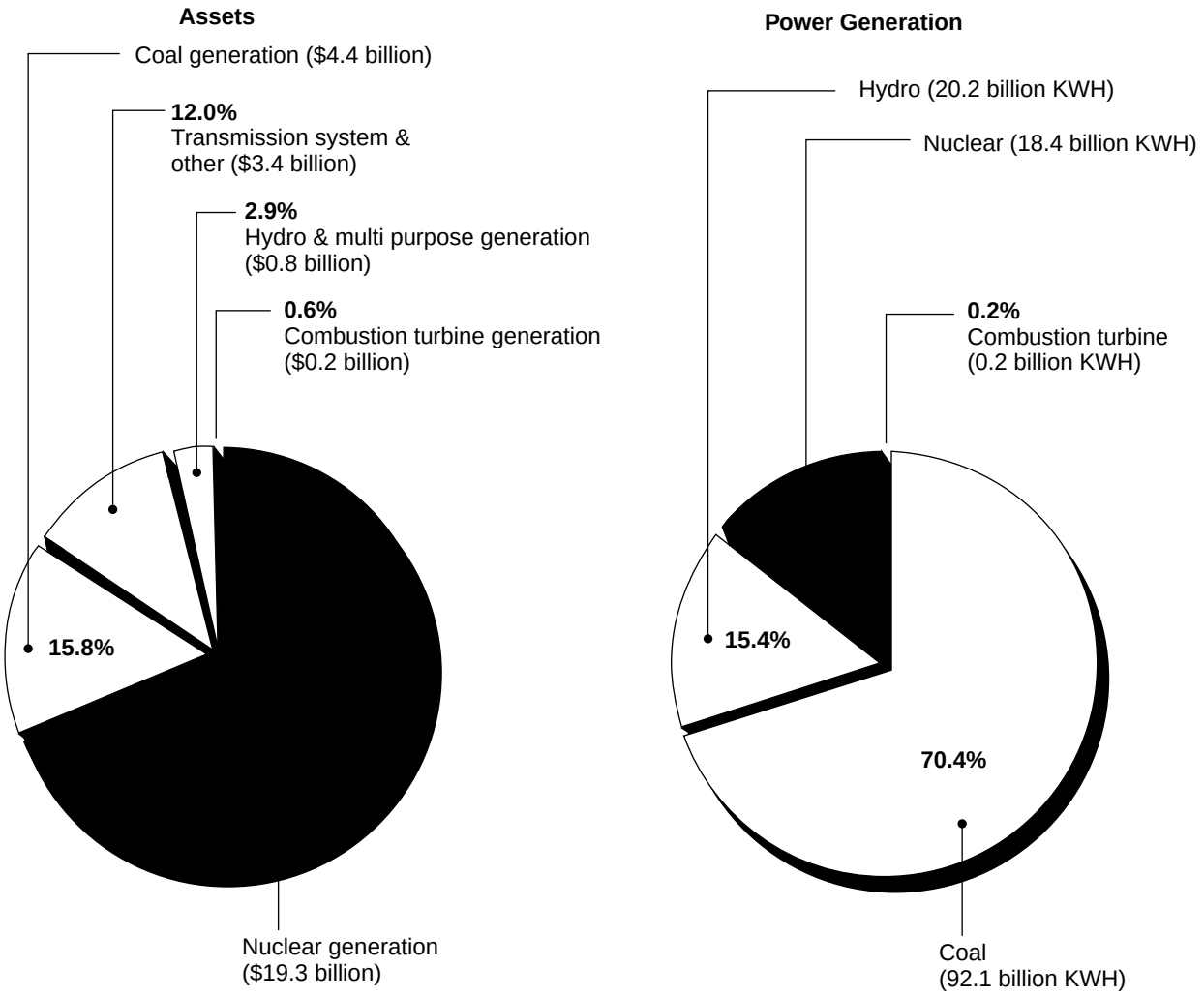
[3]Revenue requirements refer to the amount of revenue necessary to cover all operating expenses and debt service for TVA's power program. Increases in revenue requirements will cause a rate increase only if TVA cannot offset them. TVA projects its requirements annually and uses this estimate as the basis for setting electricity rates.

[4]In addition to its nonproducing nuclear assets, TVA has an additional $2 billion of construction in progress involving non-nuclear assets. For IOUs, deferred assets include only construction in progress.

On September 30, 1994, TVA's power program had net assets of almost $32 billion, ranking it in terms of assets as one of the largest electric utilities in the United States. TVA's asset composition reflects the capital intensive requirements of the electric utility industry. Nearly 90 percent ($28.1 billion) of TVA's net assets were classified as property, plant, and equipment (PP&E), including coal, hydroelectric, and nuclear power units and transmission lines. Of the $28.1 billion of net PP&E, $19.3 billion was invested in nuclear power generation assets at September 30, 1994.

The substantial investment in nonproducing nuclear assets is evident by comparing the residual investments, net of depreciation, in TVA's various fuel sources with actual power generated, as shown in figure 2.1. Although investment in nuclear assets accounted for nearly 69 percent of TVA's net PP&E as of September 30, 1994, TVA's nuclear units supplied only 14 percent of its total system power generation. In contrast, TVA's coal and hydroelectric units accounted for nearly 19 percent of net PP&E on September 30, 1994, while supplying almost 86 percent of TVA's generated power.

Figure 2.1: TVA's $28 Billion in Net Property, Plant, and Equipment as of September 30, 1994, and Power Generation by Fuel Source for Fiscal Year 1994



Note: Assets are net of accumulated depreciation.

Source: TVA 1994 financial statements.

Substantial Debt Incurred

TVA finances its PP&E primarily with debt. As of September 30, 1994, TVA had cumulatively financed 77 percent of its gross PP&E with debt. In practice, TVA issues debt when its expenditures for PP&E exceed the net

cash it generates from operations. For example, in fiscal year 1994, TVA's expenditures for PP&E were $2 billion while net cash from operations amounted to about $1.1 billion. As a result, TVA's total outstanding debt increased during 1994 by approximately $900 million.

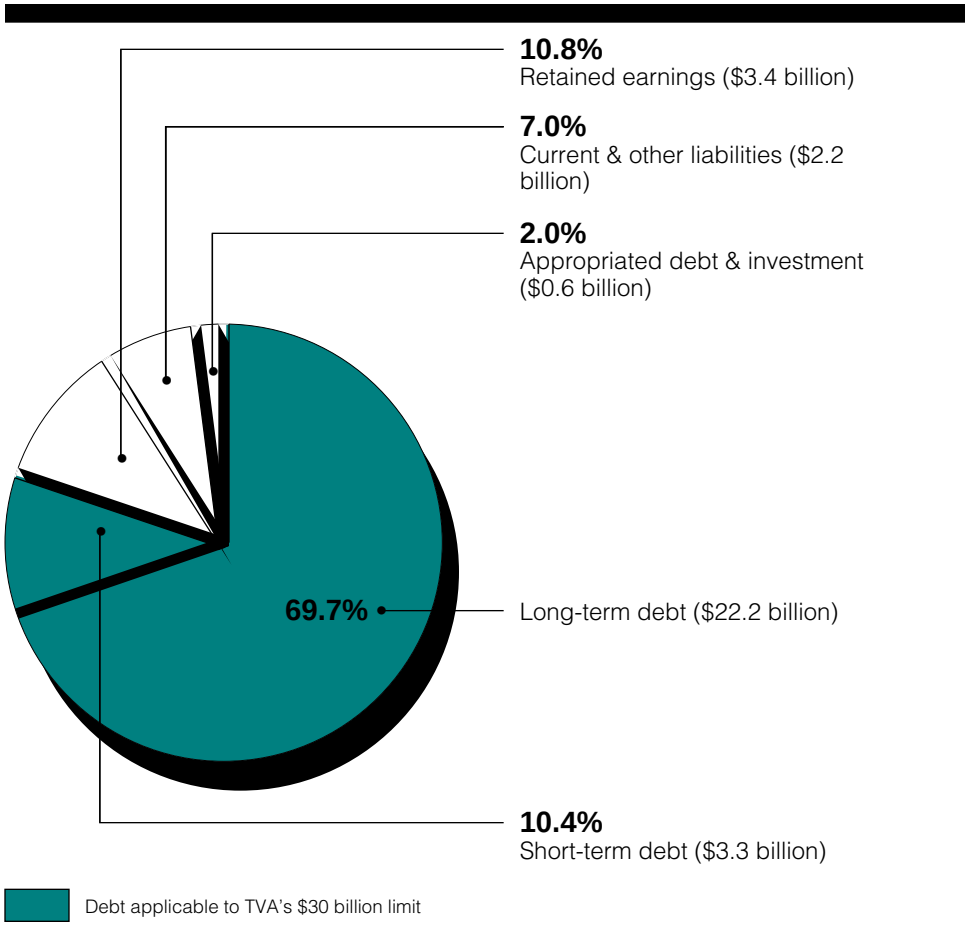
As of September 30, 1994, TVA's debt consisted primarily of about $22.2 billion of outstanding long-term debt, about $3.3 billion of short-term debt, and approximately $0.4 billion of appropriated debt.[5] This last form of debt represents funds appropriated or property transferred by the federal government to TVA for power facilities and is not included in its statutory debt calculation. TVA is required by section 15d of the TVA Act to repay the approximate $0.4 billion debt with interest to the United States Treasury. TVA's outstanding debt subject to the $30 billion statutory limit has grown steadily from $15 billion at the end of fiscal year 1983 to $25.5 billion at the end of fiscal year 1994. TVA's debt resulted in fiscal year 1994 total interest expense of nearly $1.9 billion,[6] representing about 35 percent of TVA's operating revenue. We estimate that $833 million of TVA's gross interest expense is associated with its $14 billion investment in nonproducing nuclear assets. Figure 2.2 breaks down TVA's capitalization[7] and liabilities by balance sheet account.

[5]Of TVA's total debt, $3.9 billion is owed to the federal government ($3.4 billion is owed to the Federal Financing Bank, about $0.4 billion is appropriated debt, and about $0.1 billion is owed to the U.S. Treasury). For purposes of comparison later in this chapter, TVA's total debt includes $215 million in capital lease obligations.

[6]Total interest expense equals the sum of gross interest expense plus the interest on appropriated debt.

[7]Capitalization represents the sum of all equity accounts and long-term debt.

Figure 2.2: TVA's $32 Billion in Total Capitalization and Liabilities as of September 30, 1994



Source: TVA 1994 financial statements.

TVA's $30 billion statutory debt limit provided TVA with authority to borrow billions of dollars without seeking congressional approval. In 1979, TVA's debt ceiling was doubled from $15 billion to $30 billion. The $15 billion increase in borrowing authority greatly exceeded what was then envisioned as being required to complete TVA's nuclear construction program. Therefore, TVA did not have to request any additional borrowing authority despite the operational and construction problems associated with its nuclear program over the last 15 years.

According to credit rating agencies, TVA's creditworthiness is based on its links to the federal government rather than on the criteria applied to a stand-alone corporation. As a result, the private lending market has provided TVA with access to billions of dollars of financing at favorable rates. In accordance with section 15d of the TVA Act, TVA's debt issuances explicitly state on the bond prospectus that the bonds are neither legal obligations of, nor guaranteed by, the U.S. government. Nevertheless, TVA's bonds are rated by the major credit rating agencies as if they have an implicit federal guarantee. The Standard & Poor's credit rating agency's "AAA" rating for TVA bonds is not based on a default, risk-based analysis. Instead, the credit rating agency based its rating on the determination that TVA's bonds have characteristics that would confer "agency status,"[8] similar to securities issued by government-sponsored enterprises.[9] TVA's "AAA" rating provides it with the ability to borrow at lower interest rates and provides it with a competitive advantage. An official from Moody's credit rating agency confirmed that it employs substantially the same criteria as employed by Standard & Poor's when rating TVA's bonds.

TVA Has Deferred Significant Costs

TVA is excluding $14 billion in nonproducing nuclear assets from its revenue requirements and, hence, from its rates. TVA considers these assets to be construction in progress. As such, the costs of these assets will not be included in rates until the units are either completed and placed into service or cancelled. TVA charges the cost of its PP&E and cancelled plant to ratepayers through depreciation and amortization expense.[10] TVA is required by law to set rates so that power revenues cover all operating expenses, including depreciation and amortization. While the nonproducing nuclear assets are not presently being depreciated or amortized, the estimated $833 million of annual interest expense from the debt associated with these assets is included in current rates.

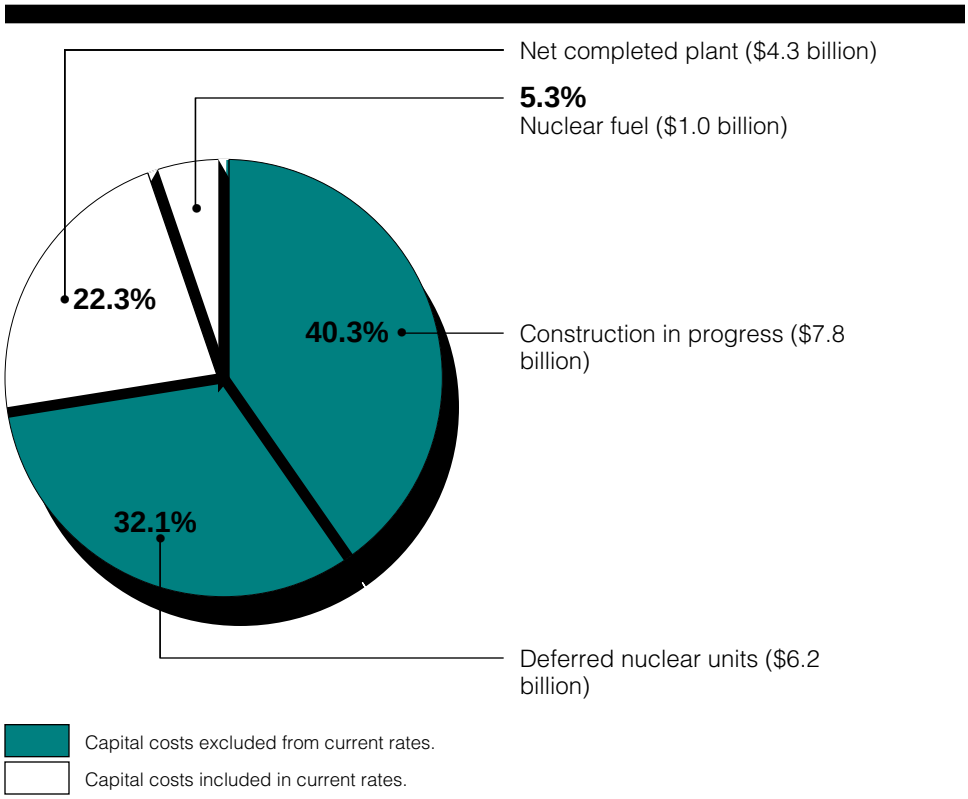
[8]Standard & Poor's rating criteria attribute agency status to securities issued by entities related to the federal government because the securities have some of the attributes of U.S. Treasury securities, such as being exempt from Securities and Exchange Commission registration requirements.

[9]Government-sponsored enterprises are federally established, privately owned corporations designed to increase the flow of credit to specific economic sectors. Examples include the Federal National Mortgage Association, Federal Home Loan Mortgage Corporation, and Student Loan Marketing Association.

[10]Depreciation is the allocation of the expense associated with PP&E to each period benefited by the asset. Amortization is the allocation of expenses associated with intangible and other assets, such as abandoned plant, to each period benefitted. Both are calculated by dividing the costs of the asset by its estimated useful life or allowable period of time. In this report, we use depreciation to describe allocation of costs related to PP&E, and amortization to describe allocation of costs for all other assets.

Any business in a capital-intensive industry would likely have a certain level of PP&E that is under construction and not being depreciated. However, the size and length of TVA's deferral is unique. On September 30, 1994, the $14 billion in nonproducing nuclear assets accounted for about 73 percent of TVA's $19.3 billion net nuclear PP&E. In addition, Watts Bar 1 has been under construction for 22 years—about double the average construction period for TVA's three operating nuclear plants. Figure 2.3 shows the components of net nuclear PP&E for fiscal year 1994.

Figure 2.3: TVA's $19.3 Billion in Net Nuclear Property, Plant, and Equipment as of September 30, 1994



Note: Assets are net of accumulated depreciation.

Source: TVA 1994 financial statements.

By the end of fiscal year 1994, TVA had depreciated $1.4 billion, or about 7 percent, of its $20.7 billion investment in gross nuclear PP&E. Therefore,

93 percent of TVA's gross nuclear PP&E as of September 30, 1994, must be paid for by future ratepayers.

Nonproducing Nuclear Assets Will Impact Revenue Requirements

The extent of the increase in revenue requirements will depend on when and over what period of time TVA begins recovering its nearly $14 billion of nonproducing nuclear assets. A shorter time period increases costs for current ratepayers while giving TVA more flexibility in future years; in contrast, a longer period minimizes the impact on current rates. To date, TVA has not decided the time period for recovering the $6.2 billion invested in deferred nuclear units. According to TVA, it is considering cancelling the deferred units and amortizing the associated costs over 30 years. When TVA cancelled the eight nuclear units during the 1980s, it wrote them off over an amortization period of only 10 years. According to TVA, its bond covenants prevent it from charging the deferred nuclear assets against retained earnings. However, TVA has great latitude in determining when and over what period the $6.2 billion of costs for deferred nuclear units will be brought into revenue requirements.

If TVA is able to bring Watts Bar 1 and Browns Ferry 3 on line as planned, the $8.5 billion of total estimated cost to complete and restart these units would be depreciated over their estimated useful lives. TVA has established the useful life of a nuclear reactor to be 40 years based on its NRC operating license. Thus, Watts Bar 1 would be depreciated over 40 years. Presently, costs associated with restarting Browns Ferry 3, which went into commercial service in 1977, would be depreciated over the 22 years remaining on its operating license.

For illustrative purposes, we estimated the impact of including depreciation and amortization expense for the nonproducing nuclear assets on future revenue requirements. We used the depreciation and amortization periods as described above. Using TVA's cost-to-complete projections, we estimated, as shown in table 2.1, that the nonproducing nuclear assets would increase TVA's revenue requirements by a total of $454 million per year for at least the next 22 years. This would result in a 9-percent increase in revenue requirements. If the maximum amortization period for its deferred nuclear assets was only 15 years, then TVA's annual revenue requirements would increase by $660 million, or 12 percent.[11]

[11]The 9-percent and 12-percent increases were calculated by dividing our estimated $454 million and $660 million increases in revenue requirements by TVA's 1994 total revenue requirements of $5.3 billion. These estimated annual increases do not include any additional operating and maintenance expenses.

Table 2.1: Estimated Annual Increase in Revenue Requirements for Nonproducing Nuclear Assets as of September 30, 1994

Dollars in billions

Nonproducing nuclear assets	Total estimated cost to be depreciated/ amortized[a]	Estimated depreciation/ amortization period (in years)	Estimated annual increase in revenue requirements
Deferred Nuclear Units			
Watts Bar 2 Bellefonte 1 Bellefonte 2	$6.2	30	$0.207
Construction In Progress			
Watts Bar 1	6.8	40	0.170
Browns Ferry 3	1.7	22	0.077
Total	**$14.7**	**/—**	**$0.454**

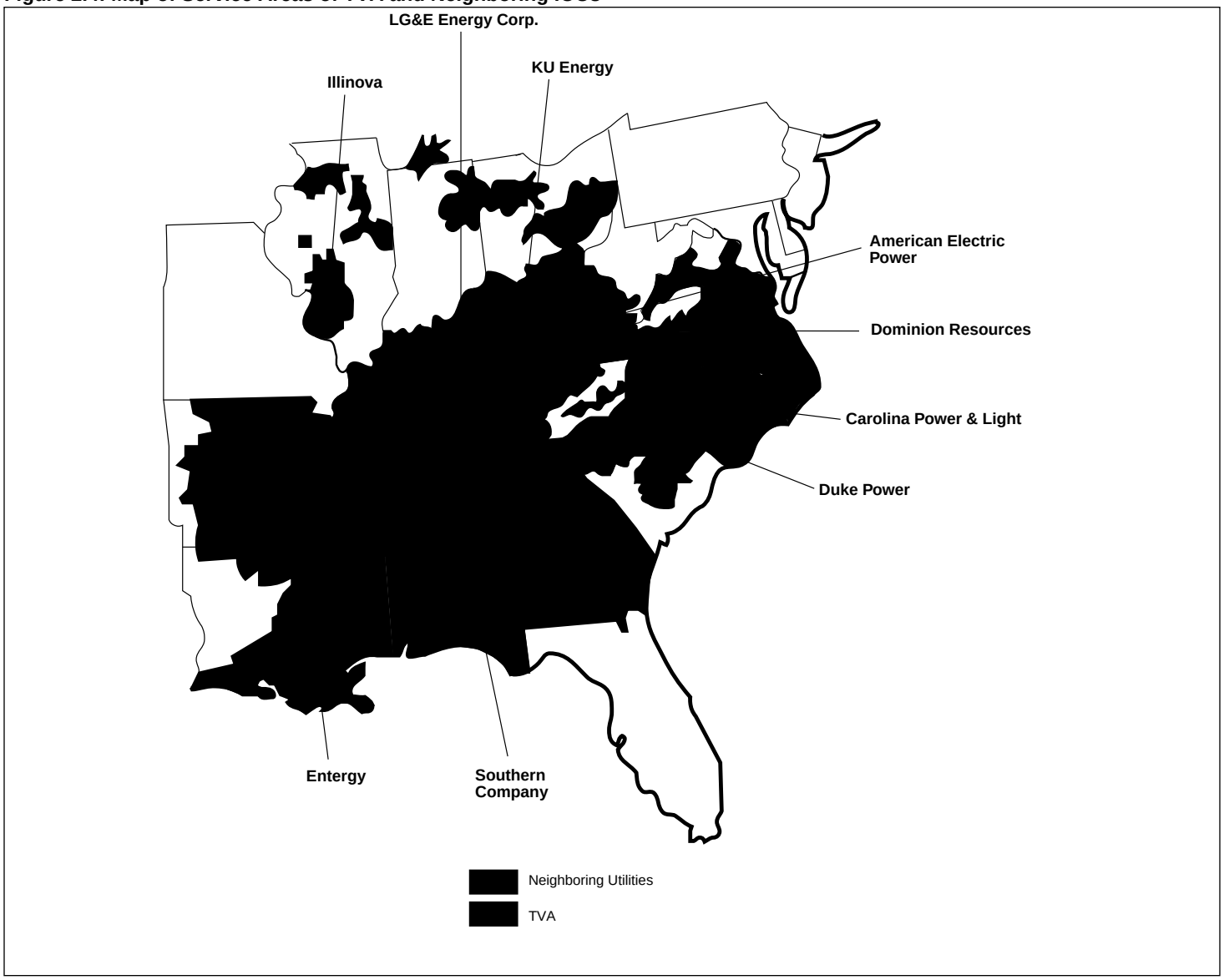
[a]Total estimated cost assumes TVA will (1) not spend additional capital on Watts Bar 2 or Bellefonte 1 and 2 and (2) spend approximately $900 million to complete Watts Bar 1 and Browns Ferry 3 in addition to the $7.6 billion already spent.

Source: GAO analysis of TVA data.

TVA Has Substantially Higher Financing Costs and Deferred Assets Than Neighboring Utilities

To put TVA's financial condition in perspective, we compared its financing costs and deferred assets to nine nearby IOUs. According to industry experts, TVA's competition is most likely to come from nearby utilities because of the cost of wheeling power. In addition, as discussed in chapter 4, some of these utilities have submitted bids to provide electricity to TVA's customers that are seeking power sources other than TVA. Differences in financing structures between TVA and IOUs make a direct comparison somewhat difficult. However, TVA's customers are primarily concerned about electricity rates, not financing structure. Thus comparing TVA to its neighboring IOUs is essential. We believe the ratios we use in our comparison are indicators of the ability of TVA to compete with neighboring IOUs. Figure 2.4 shows a map of the service areas of TVA and neighboring IOUs.

Figure 2.4: Map of Service Areas of TVA and Neighboring IOUs



Source: Moody's 1994 Public Utilities Manual and 1993 and 1994 annual reports of the neighboring IOUs.

TVA has substantially more financing costs and deferred assets than its neighboring utilities. In five key financial ratios we examined, TVA's ratios,

overall, indicated that it would be less competitive than the other nine utilities. Three of these ratios are indicators of flexibility. First, TVA's ratio of financing costs to revenue is more than twice as high as the average for other utilities, despite TVA's ability to borrow at lower interest rates. TVA's high financing costs provide it with less flexibility to reduce costs and hence lower its rates to meet price competition. Because TVA continues to borrow and is not currently repaying any principal on its nonappropriated debt, this ratio is not likely to decrease soon. In addition, TVA's substantial debt subjects it to a much greater risk of rising interest rates than its competitors. To illustrate TVA's interest rate risk, if the interest rates at which TVA must refinance its approximately $8.4 billion in debt maturing by 1998 increase by 1 percent, TVA's annual finance costs will increase by about $84 million (about 1.6 percent of TVA's 1994 operating revenue).

Second, TVA's ratio of fixed financing costs to revenue is four times higher than the average of its neighboring IOUs. All of TVA's financing costs are interest expense and thus are fixed. On the other hand, IOUs common stock dividends are not contractual obligations that have to be paid. Thus, this ratio further shows that IOUs have more flexibility than TVA.

Third, TVA's ratio of net cash from operations[12] to expenditures for PP&E and common stock dividends in 1994 was only 57 percent; in contrast, the average for the nine IOUs was 95 percent. Three of the nine IOUs had sufficient net cash provided by operations to pay for 100 percent of their PP&E expenditures and common stock dividends and the other six IOUs had ratios ranging from 54 percent to 92 percent. This ratio reflects TVA's inability in fiscal year 1994 to pay for its PP&E with cash generated from operations. Unlike most of TVA's neighboring IOUs that generated sufficient cash to pay for all or a substantial portion of their expenditures for PP&E and common stock dividends, TVA had to borrow to pay for about half of its expenditures for PP&E.

The other two ratios are indicators of deferred assets. For the first indicator, TVA's ratio of accumulated depreciation and amortization to gross PP&E is 17 percent of its $34 billion investment. The other utilities have ratios averaging 35 percent. This ratio indicates that little of TVA's PP&E has been taken into its rates via depreciation and amortization, and therefore TVA's rates do not reflect all relevant costs. Second, TVA's deferred assets represent 47 percent of its gross PP&E, while the ratio for

[12]Net cash from operations represents cash received primarily from customers less cash paid for operating expenses. The cash in excess of operations is available for expenditures for PP&E, payment of dividends, and other investing and financing activities. Since TVA does not issue common stock, it pays no dividends.

the nine IOUs averaged 3 percent. The costs that are being deferred from current rates must be recouped either through future rates or written off against retained earnings. Including TVA's $15.7 billion of deferred assets (as of September 30, 1994) in future rates will make TVA less competitive. In addition, as mentioned previously, TVA paid nearly $833 million of interest expense in fiscal year 1994 for these assets that do not currently benefit them.

Table 2.2, which compares these key financial ratios of TVA with the nine neighboring IOUs, shows that TVA's high financing costs and deferred assets will make it difficult for TVA to compete. Appendix III describes the methodology used for computing these ratios.

Table 2.2: Comparison of Key Financial Ratios for TVA and Neighboring IOUs, 1994

(Figures in percent)

	Indicators of flexibility			Indicators of deferred assets	
Utility	Financing costs to revenue	Fixed financing costs to revenue	Net cash from operations to expenditures for PP&E and CSD	Accumulated depreciation/ amortization to gross PP&E	Deferred assets to gross PP&E
AEP	16	8	90	38	1
CP&L	16	7	132	35	2
DR	19	9	86	34	5
DP	16	7	81	36	4
ENT	20	13	121	32	2
IL	14	11	115	31	5
KU	15	6	54	40	4
LG&E	14	6	82	35	1
SC	18	9	92	31	4
TVA	**35**	**35**	**57**	**17**	**47**
IOU Summary					
Average	16	8	95	35	3
High	20	13	132	40	5
Low	14	6	54	31	1

Note: CSD - common stock dividends, AEP - American Electric Power, CP&L - Carolina Power and Light, DR - Dominion Resources, DP - Duke Power, ENT - Entergy, IL - Illinova, KU - KU Energy, LG&E - LG&E Energy Corp., and SC - Southern Company.

Source: GAO analysis of 1994 annual reports.

To further illustrate how difficult it will be for TVA to compete with neighboring utilities, we compared it with American Electric Power. American Electric has excess electricity to sell and has already bid to supply power to two TVA-served distributors. American Electric had about the same amount of system capacity and operating revenues as TVA in fiscal year 1994. However, as shown in table 2.3, at the end of fiscal year 1994, TVA had net total assets that were more than double those of American Electric. Thus, in order to produce approximately the same amount of power and revenues from its operations, TVA needed twice the investment in assets as American Electric.

Table 2.3: Fiscal Year 1994 Key Statistics for TVA and American Electric Power

Dollars in millions

	TVA	AEP
System capacity (MW)	25,913[a]	23,670
System sales (in millions of kilowatt hours)	122,574	116,714
Net total assets	$31,842	$15,713
Deferred assets[b]	$15,726	$259
Total debt	$26,136	$6,309
Operating revenues	$5,401	$5,505
Net financing costs	$1,772	$887
Net fixed financing costs	$1,772	$443
Depreciation and amortization expense	$639	$572

[a]Represents dependable capacity currently in service. It excludes about 2,230 MW of capacity for Watts Bar 1 and Browns Ferry 3 that TVA plans to bring into commercial service in 1996.

[b]Deferred assets are included in net total assets. The deferred assets include about $8 billion associated with Watts Bar 1 and Browns Ferry 3.

Source: 1994 annual reports.

TVA's debt was four times greater than American Electric's, and TVA's net financing costs were $1,772 million, or about double that of American Electric's. Because TVA's financing costs are twice as high and its net fixed financing costs are four times higher than American Electric, it is unlikely that TVA, over the long run, can sustain rates that are competitive with those of American Electric. TVA had $67 million more of depreciation and amortization expense in fiscal year 1994 than American Electric. Because TVA will ultimately have to amortize or depreciate its nonproducing nuclear assets, its future amortization and depreciation expense could be substantially higher than American Electric's—possibly twice as high.

We do recognize that TVA has certain cost advantages over American Electric. For example, TVA had lower fuel costs and does not pay federal income tax. However, these advantages do not offset the substantial financing costs advantage of American Electric.

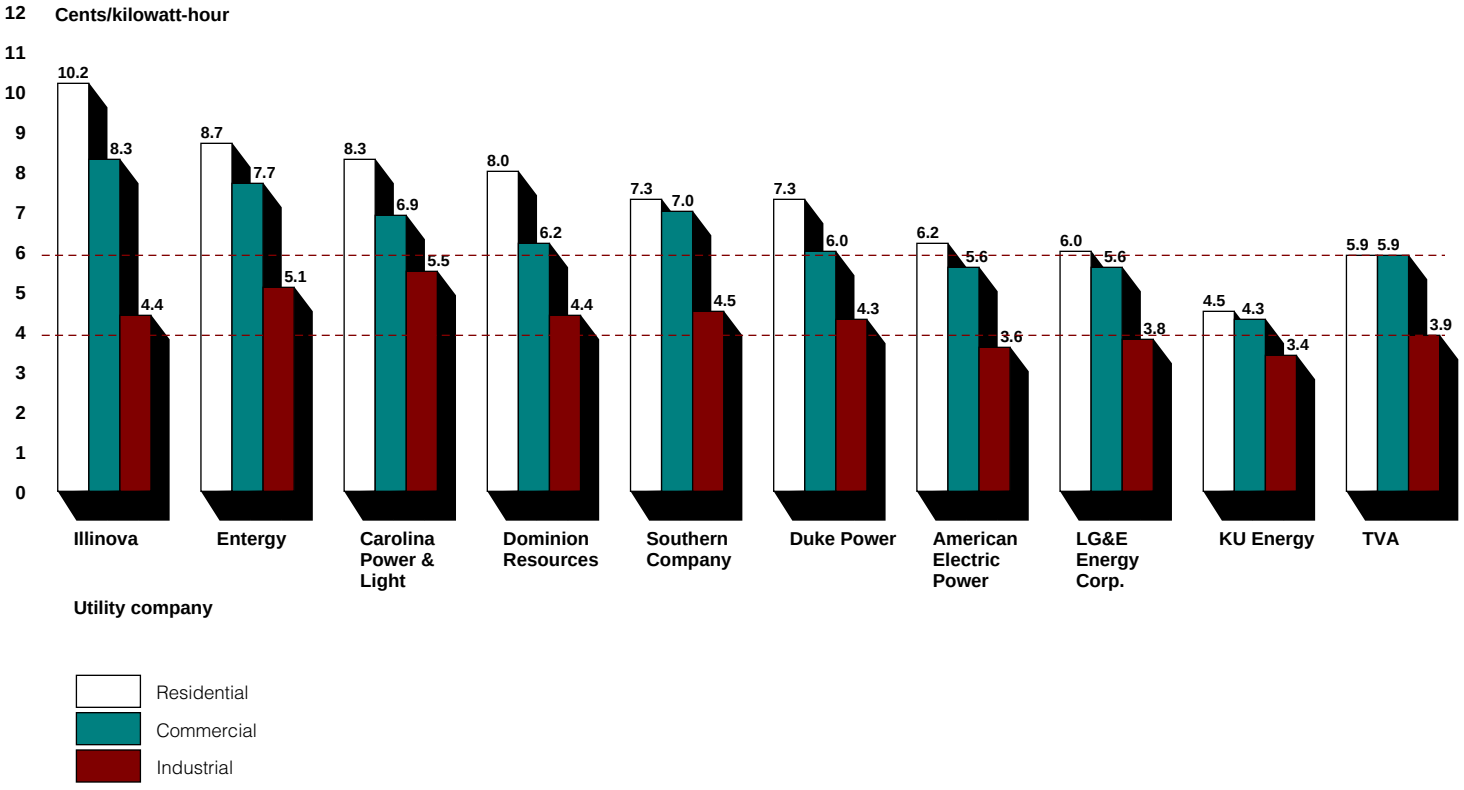
TVA's Average Retail Rates Are Mixed Compared to Neighboring Utilities but Exclude Substantial Costs

TVA's average retail[13] electricity rates are mixed—some higher and some lower—when compared with the rates of neighboring utilities. However, as discussed previously, TVA's rates do not include its nonproducing nuclear assets and thus do not reflect all relevant costs. In the evolving competitive market, utilities with the lowest costs and lowest rates will be at a competitive advantage.

As shown in figure 2.5, TVA's residential, commercial, and industrial rates are low compared with the rates charged by several neighboring utilities; however, TVA's rates are less competitive than those of some of its neighbors. Appendix III describes the methodology used for computing the rates in figure 2.5.

[13]Retail rates are the rates paid by the ultimate consumer. For TVA, this would include the cost added by its wholesale distributors.

Figure 2.5: TVA's and Neighboring Utilities' Average Retail Residential, Commercial, and Industrial Rates for 1993



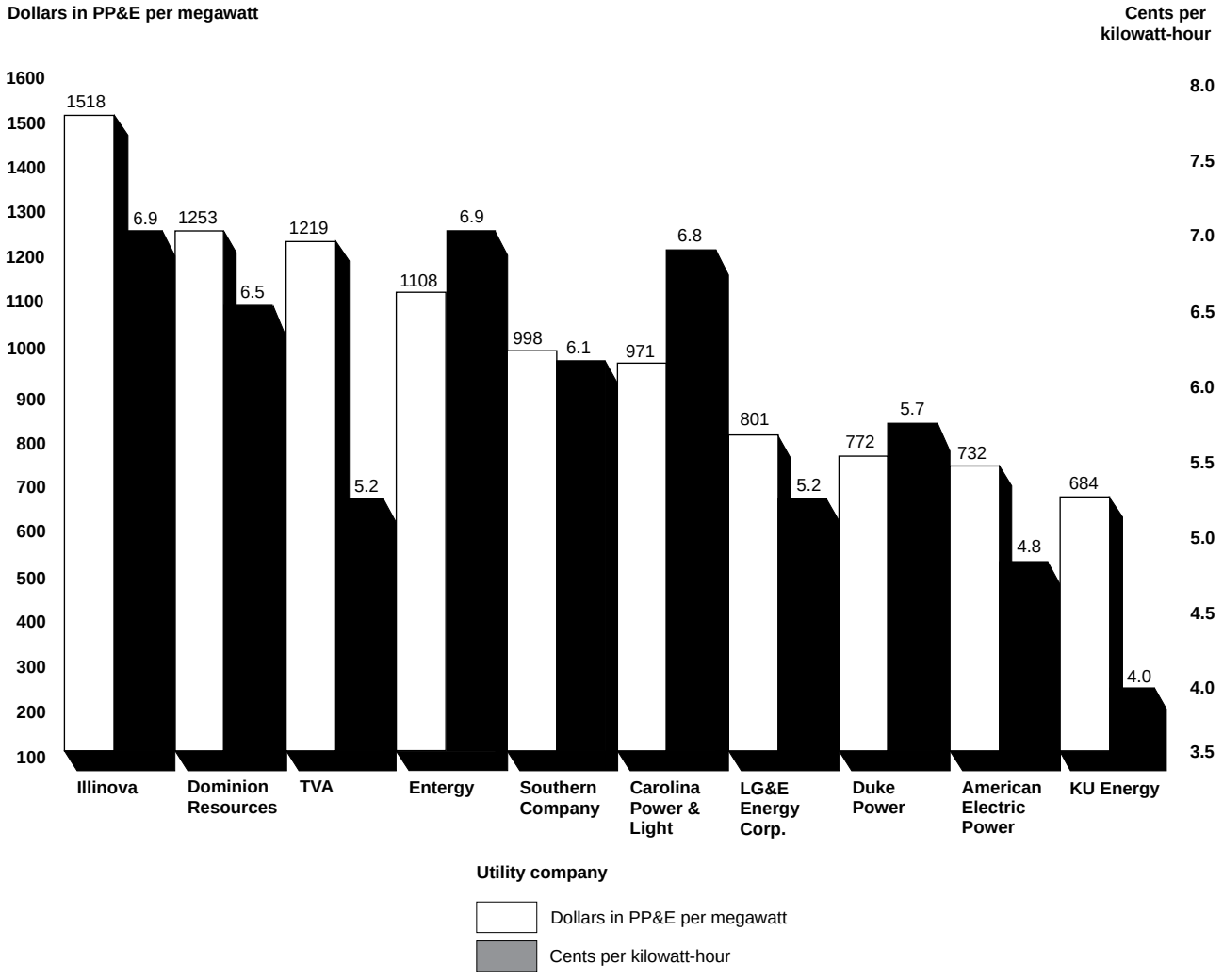
Source: TVA data and GAO analysis of Financial Statistics of Major U.S. Investor-Owned Utilities 1993, Energy Information Administration, U.S. Department of Energy, January 1995.

Including TVA's $14 billion of nonproducing nuclear assets and the estimated $900 million to complete Watts Bar 1 and Browns Ferry 3 is likely to increase TVA's rates and make it less competitive with neighboring utilities. Further compounding TVA's competitive position, FERC is projecting that electricity rates will fall. Specifically, FERC stated that "more competition will mean lower rates for wholesale customers and, ultimately, for consumers."[14]

[14]Notice of Proposed Rulemaking and Supplemental Notice of Proposed Rulemaking (70 FERC 61.357), FERC (Mar. 29, 1995).

To analyze TVA's competitiveness with its nine neighboring utilities, we compared the investment in PP&E per megawatt of capacity—which depicts a utility's efficiency in building generating plants—with the average system rates. TVA's ratio includes the estimated $900 million to complete Watts Bar 1 and Browns Ferry 3 and their expected generating capacity. As shown in figure 2.6, KU Energy has invested less in power plants to meet its demand and thus enjoys lower rates. Although TVA's average system rate is currently competitive, once TVA brings its nonproducing nuclear assets and costs to complete Watts Bar 1 and Browns Ferry 3 into its revenue requirements, it will be difficult for TVA to offer rates competitive with its neighbors. Appendix III describes the methodology used for computing the average system retail rates and ratios in figure 2.6.

Figure 2.6: Investment in PP&E Per Megawatt of Generating Capacity and Average System Retail Rates for TVA and Neighboring IOUs for Fiscal Year 1993



Source: GAO analysis of financial data in 1993 annual reports and Financial Statistics of Major U.S. Investor-Owned Utilities 1993, Energy Information Administration, U.S. Department of Energy, January 1995.

Continuing Cost Overruns in Nuclear Program Could Impact Other Power Resources

TVA has a troubled history of building and operating nuclear plants. As mentioned earlier, TVA has "mothballed" four nuclear units and is continuing construction and modification at two units to bring them into commercial operation in calendar year 1996. Watts Bar 1 has been under construction for over 22 years and is currently estimated to cost $6.8 billion at completion. Browns Ferry 3, shut down in 1985, is not expected to be put back into commercial operation until 1996 at a total restart cost of about $1.7 billion. Both facilities have experienced continual delays in their scheduled completions and resultant increases in their estimated costs to complete—called cost overruns.

TVA also faces the need for a substantial investment in its primary power resources—its aging coal and hydroelectric plants. TVA expects its coal and hydroelectric system to continue to produce most of its electricity. It anticipates spending hundreds of millions of dollars per year for the next 26 years to upgrade these plants and meet Clean Air Act requirements. However, further delays and cost overruns with Watts Bar 1 and Browns Ferry 3 could limit capital funds available for needed improvements to the coal and hydroelectric plants.

Construction Activities at Two Nuclear Units Continue to Increase Debt and Deferred Assets

Construction activities at two nuclear units, Watts Bar 1 and Browns Ferry 3, have involved years of schedule slips and billions of dollars of cost overruns. Despite the problems, according to TVA's management, these units are TVA's most cost-effective resource options, given its short-term energy needs. According to TVA, the high costs of stopping work while the IRP process determined future resources precluded TVA from including these units in the process as options.

Schedule Delays and Cost Overruns Continue at Watts Bar 1

Although TVA certified to NRC that Watts Bar 1 qualified for an operating license in 1985, NRC did not grant one because of unresolved safety concerns—NRC received over 5,000 employee concerns regarding construction deficiencies and management practices. Between 1990 and 1993, TVA and NRC jointly agreed on 28 major corrective programs that must be completed before Watts Bar 1 could receive its operating license. According to TVA, one of these corrective programs necessitated that TVA replace 457 miles of electrical cable for the unit's safety systems at a cost of $22 million. As of March 1995, TVA had closed out 10 of the 28 corrective programs with NRC.

Table 3.1 shows the growth in total estimated cost at completion and the slipped scheduled operation date for Watts Bar 1 over the last 5 fiscal years. Total estimated cost at completion has increased about $1.6 billion during this period.

Table 3.1: Watts Bar 1 Estimated Costs and Scheduled Operation Dates as of the End of the Last 5 Fiscal Years

Dollars in millions

	1990	1991	1992	1993	1994
Balance sheet investment at year-end	$4,773	$5,151	$5,553	$6,035	$6,445
TVA estimated cost to complete	476	805	479	516	355
TVA total estimated cost	$5,249	$5,956	$6,032	$6,551	$6,800
Scheduled commercial operation date	March 1992	March 1994	June 1994	Jan. 1995	Feb. 1996[a]

[a]This date was established in June 1995.

Source: GAO analysis of TVA data.

At an October 1994 meeting with NRC, TVA's management disclosed numerous construction problems, first identified in the mid-1980s, that TVA had been unable to correct to NRC's specifications. According to TVA's management, these problems should have been corrected years ago. However, due to poor quality controls, TVA has not been able to show that the deficiencies were corrected. In some instances, TVA had certified to NRC that safety issues were "closed" when, according to NRC, they were still unresolved. At the meeting, NRC officials stated that the problems at Watts Bar 1 were the result of TVA's inability to manage the project and TVA's lack of quality assurance and oversight. In a December 1994 memorandum, NRC's Regional Administrator overseeing Watts Bar 1 stated, "These deficiencies have raised concerns about TVA's ability to correct problems that must be resolved before Watts Bar can be licensed to operate."

Subsequently, in June 1995, NRC informed us that it had seen improvement in TVA's performance at Watts Bar 1. The Regional Administrator stated that "problems continue to be identified by both NRC and TVA, but NRC issues have become more isolated in nature, and TVA has become more proactive in addressing both TVA and NRC issues." He said that a Fall 1995 fuel load date was achievable, "assuming no new and significant issues emerge."

During fiscal year 1994, TVA spent an average of about $1.1 million per day at Watts Bar 1. In February 1995, TVA's estimated commercial operation date for Watts Bar 1 slipped again, from October 1995 to December 1995, and then in June 1995 the date slipped again to February 1996. On the basis of TVA's fiscal year 1993 and 1994 expenditures, we estimate that the 4-month slip at Watts Bar 1 will cost TVA about $130 million.

Restart of Browns Ferry 3 Has Been Slow and Costly

According to TVA, bringing Browns Ferry 3, which was shut down in 1985, back into commercial operation is not expected to occur until 1996 at a total estimated restart cost of about $1.7 billion. Browns Ferry 3 went into commercial service in 1977. Between 1980 and 1984, it received NRC's lowest ratings for quality assurance and plant operations. After repeated safety and regulatory concerns, in 1985, TVA shut down Browns Ferry 3 along with its other four licensed nuclear units (Sequoyah 1 and 2 and Browns Ferry 1 and 2). Prior to the shutdown, Browns Ferry 3 operated an average of 60 percent of the time while on-line.

Table 3.2 shows growth in total estimated cost at completion and the slipped scheduled operation date for Browns Ferry 3 over the last 5 fiscal years. Total estimated cost at completion has increased about $1.2 billion during this period.

Table 3.2: Browns Ferry 3 Estimated Costs and Scheduled Operation Dates as of the End of the Last 5 Fiscal Years

Dollars in millions

	1990	1991	1992	1993	1994
Balance sheet investment at year-end	$296	$406	$775	$1,171	$1,475[a]
TVA estimated cost to complete	510	610	318	780	524
TVA total estimated cost	$806	$1,016	$1,093	$1,951	$1,999
Scheduled commercial operation date	Jan. 1993	Sept. 1993	March 1994	Dec. 1995	Feb. 1996

[a]Approximately $296 million of Browns Ferry 3's costs are included in completed plant and are being depreciated and included in current rates. As a result, at the end of fiscal year 1994, TVA's estimated cost to restart Browns Ferry 3 was about $1.7 billion.

Source: GAO analysis of TVA data.

After TVA shut down all of its operating nuclear units in 1985, it concentrated on restarting the two Sequoyah units first. TVA did not begin

its efforts to restart Browns Ferry 3 until January 1991. Management at Browns Ferry stated that prior to August 1993, TVA's start-up schedules and completion costs for restarting Browns Ferry 3 were overly optimistic. As of December 1994, TVA officials reported that current expenditures at Browns Ferry 3 were still in line with its August 1993 estimate, and that the unit's construction activities had remained on schedule for over a year.

TVA is planning to reload fuel at Browns Ferry 3 in October 1995, and plans to have the unit in full commercial operation by February 1996. NRC stated that approval of Browns Ferry 3 for restart should go smoothly because the unit shares many systems with Browns Ferry 2, whose systems were inspected and approved by NRC between 1989 and 1991, when it became operational. During fiscal year 1994, TVA spent an average of $833,000 per day at Browns Ferry 3.

Cost of Completing Nuclear Units May Be Higher Than TVA Anticipated

TVA's incremental "to go" costs of completing its two nuclear units under construction may be understated. As shown previously, TVA has experienced problems building and operating nuclear power plants. However, during its IRP, TVA stated that continued investment in Watts Bar 1 and Browns Ferry 3 was economically justified because (1) TVA needed the power soon and (2) these two nuclear units were TVA's most cost-effective options for meeting expected growth in demand for power.

According to its forecast, TVA needs to bring Watts Bar 1 and Browns Ferry 3 into operation by the beginning of 1996 to have sufficient capacity[1] to meet peak demand. TVA's load forecasting methodology is discussed in appendix II. After establishing its need for power, in February 1994, TVA's calculated the economic cost of meeting future demand with these two units. Excluding its sunk cost, TVA calculated the incremental costs of completing Watts Bar 1 and Browns Ferry 3 and compared these costs with other alternative resource options. TVA's analysis projected that Watts Bar 1 and Browns Ferry 3 would generate power at a first year incremental cost of 2.1 and 2.8 cents per kilowatt hour (kwh), respectively. According to TVA, alternative resource options such as demand side management were in the range of 3.5 cents per kwh.

If TVA's historical cost overruns and operating problems continue for either of these two units, the actual "to go" cost will be greater than planned. Cost overruns for these plants increase deferred assets, debt, and

[1]Capacity is the amount of electric power that can be delivered by a generating unit at one time. TVA's current system capacity is approximately 26,000 MW, and Watts Bar 1 and Browns Ferry 3 together will bring an additional 2,230 MW of capacity to the system.

financing costs, and will ultimately put upward pressure on rates. To demonstrate, we analyzed TVA's incremental cost calculation for Watts Bar 1. We have illustrated, by using two scenarios, how the two most significant assumptions, cost-to-complete and capacity factor,[2] affect the incremental cost calculation. Table 3.3 shows the results of this analysis. Our two scenarios, a discussion of which follows, yielded incremental cost estimates of 2.8 and 5.6 cents per kwh, in contrast with TVA's estimate of 2.1 cents per kwh.

Table 3.3: Estimate of First Year Incremental Cost Analysis for Watts Bar 1

Major assumptions[a]	TVA estimate Feb.1994	Scenario 1	Scenario 2
Estimated cost-to-complete[b] (millions of dollars)	$515	$765	$1,165
Capacity factor (percentage)	76	66	38
First year incremental cost (cents per kwh)	2.1	2.8	5.6

[a]For all assumptions other than estimated cost-to-complete and capacity factor, we used TVA's estimates. These assumptions include estimates for inflation, interest rates, discount rates, decommissioning, nuclear fuel cost, nuclear fuel escalation rate, capital improvement and additions, and operations and maintenance cost.

[b]Cost-to-complete represents estimated costs incurred from September 30, 1993, to completion.

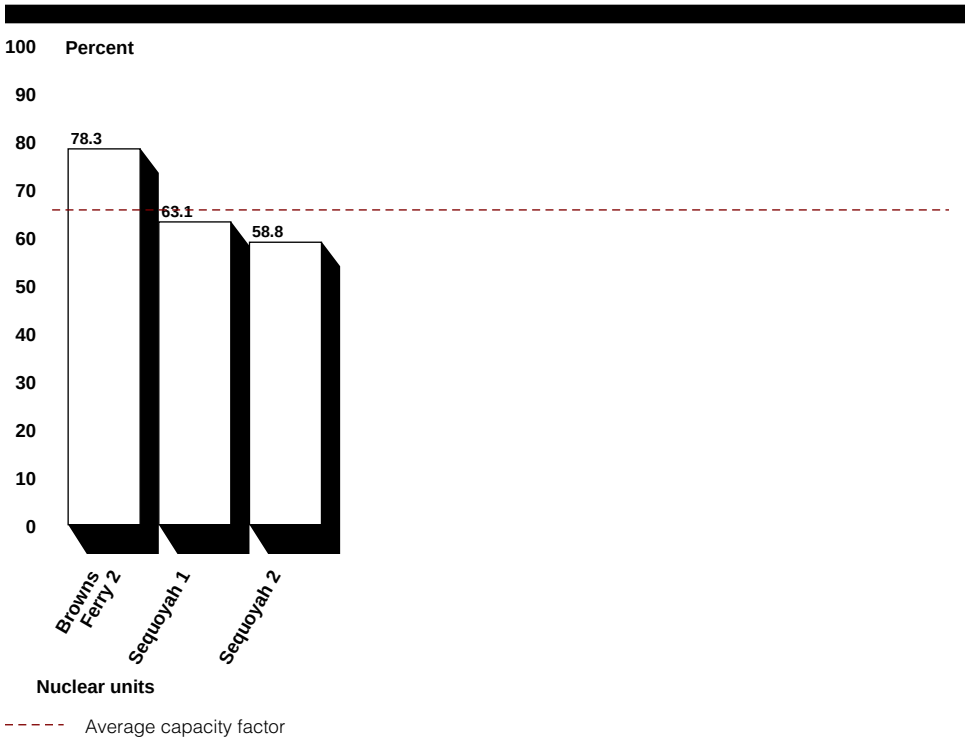
Source: GAO analysis of TVA data.

Our analysis was based on assumptions that were different than TVA's for estimated cost-to-complete and capacity factor. For scenario 1, our analysis used TVA's actual expenditures for fiscal year 1994 of $410 million, and added TVA's cost-to-complete estimate of $355 million as of September 30, 1994. For scenario 2, we assumed start-up of Watts Bar 1 would be delayed by 1 year, which would not be inconsistent with the unit's history. We assumed a delay cost of $1.1 million per day, which is approximately what TVA spent per day on the unit in fiscal year 1994. Such a schedule slip could add approximately $400 million to the cost-to-complete estimate. The scenario 1 analysis used a capacity factor of 66 percent because TVA's three nuclear units currently in operation (Sequoyah 1, Sequoyah 2, and Browns Ferry 2) have a combined average

[2]Capacity factor is the actual gross power generation of a unit divided by the maximum potential power generation for a given period of time. The resulting figure indicates the percentage of time a unit is available.

capacity factor of 66 percent since their restarts in 1989, 1988, and 1991, respectively, as shown in figure 3.1.

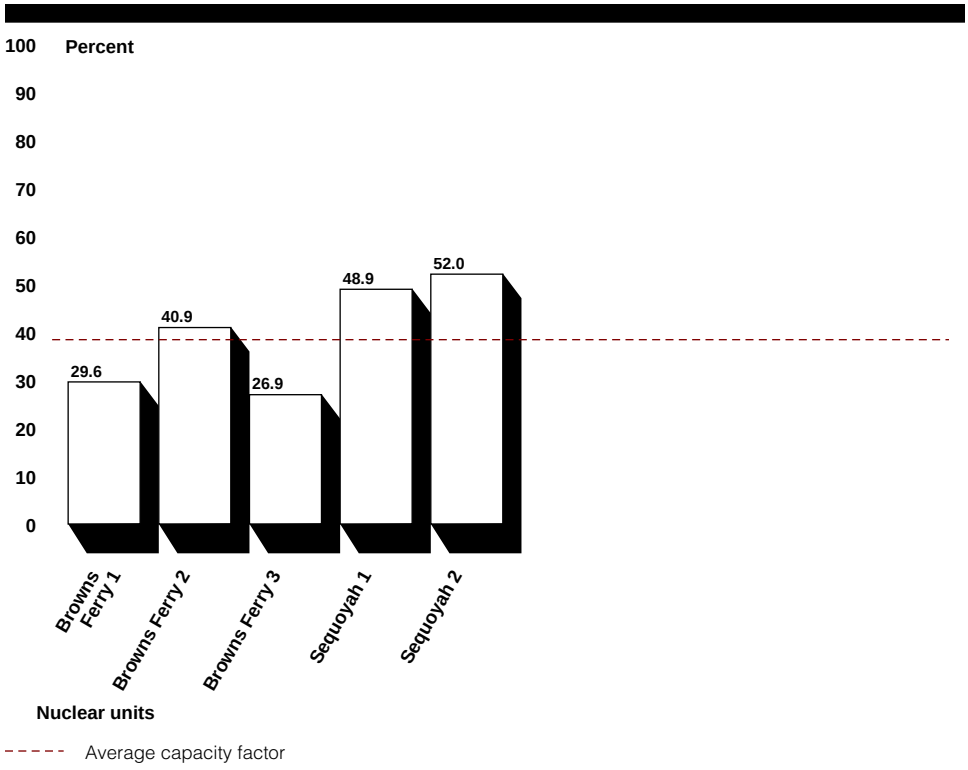
Figure 3.1: TVA's Three Operating Nuclear Units' Average Capacity Factor Since Restart, as of September 30, 1994



Source: GAO analysis of TVA data.

In the scenario 2 analysis, we decreased TVA's anticipated capacity factor for Watts Bar 1 from 76 percent to 38 percent. Our analysis of TVA's nuclear generating capacity, as illustrated in figure 3.2, shows that TVA's five licensed nuclear units have operated at a combined average capacity factor of 38 percent since their original start-up.

Figure 3.2: TVA's Five Licensed Nuclear Units' Average Capacity Factor Since Original Start-Up



Source: GAO analysis of TVA data.

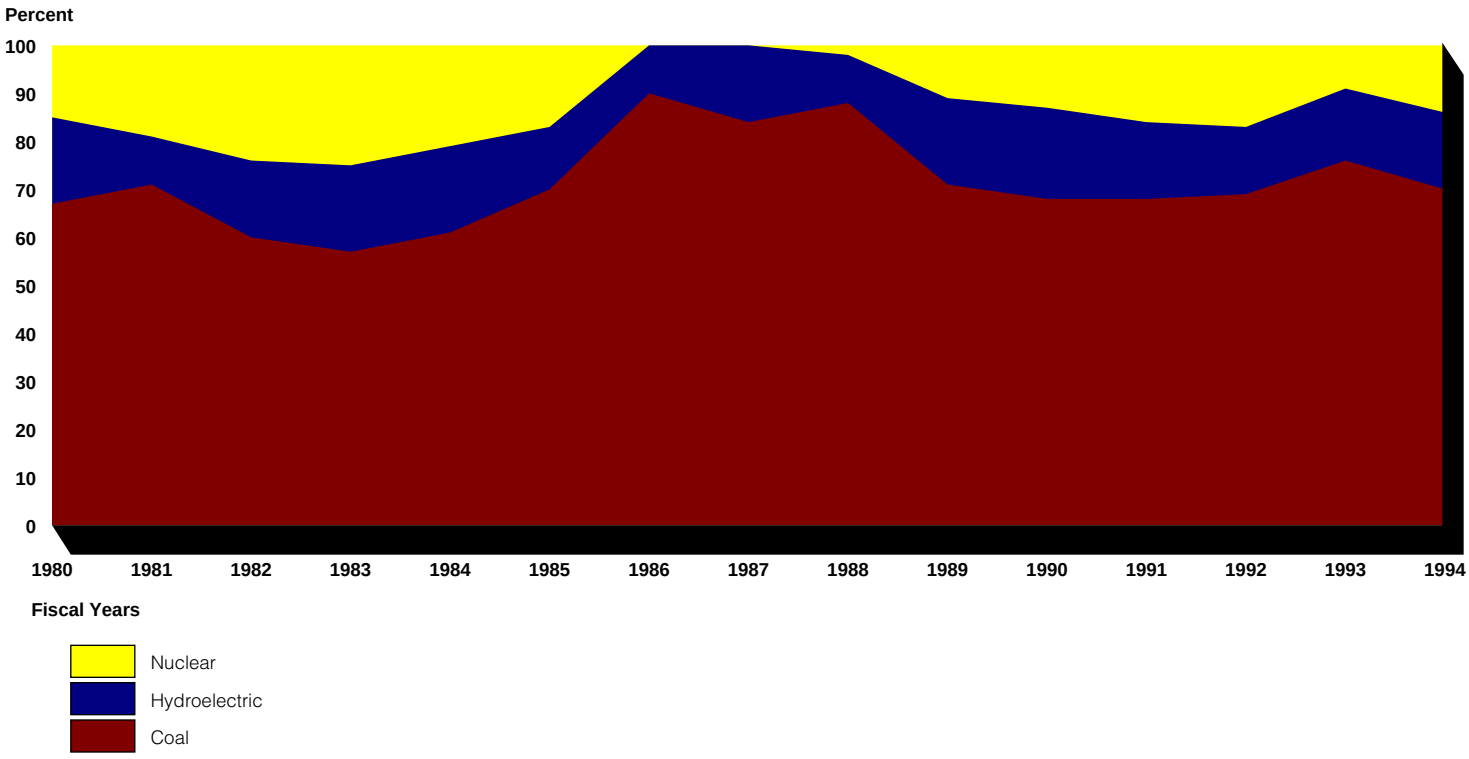
Cost for Nuclear Construction Could Affect Coal and Hydroelectric Program Improvements

The outcome of TVA's nuclear program could limit capital funds available for needed improvements to its coal and hydroelectric plants. TVA is dependent on its coal and hydroelectric generating plants, and since the early 1980s, has generated the vast bulk of its power from these sources. Yet, while relying more on hydroelectric and coal-fired sources of power, TVA decreased its capital expenditures for these plants during the 1980s in anticipation of nuclear generation coming on-line. Despite having made significant improvements recently to its coal and hydroelectric units, TVA anticipates needing between $240 million and $301 million per year in constant 1994 dollars for these plants over the next 26 years. In addition, TVA estimates that it will need substantial capital to meet the requirements of the Clean Air Act.

System Generation Dependent Upon Coal and Hydroelectric Units

TVA's system of hydroelectric dams and coal-fired plants generated almost 86 percent of TVA's total 1994 electricity. Figure 3.3 shows that for the 15-year period from 1980 to 1994, the plants supplied an average of 86 percent of TVA's electric power, ranging from a low of 75 percent in 1982 and 1983 to a high of 100 percent in 1986 and 1987 when TVA's nuclear units were shut down.

Figure 3.3: TVA Power Generation by Fuel Source, Fiscal Years 1980-1994



Source: TVA data.

Reduced Capital Expenditures for Coal and Hydroelectric Generation During 1980s

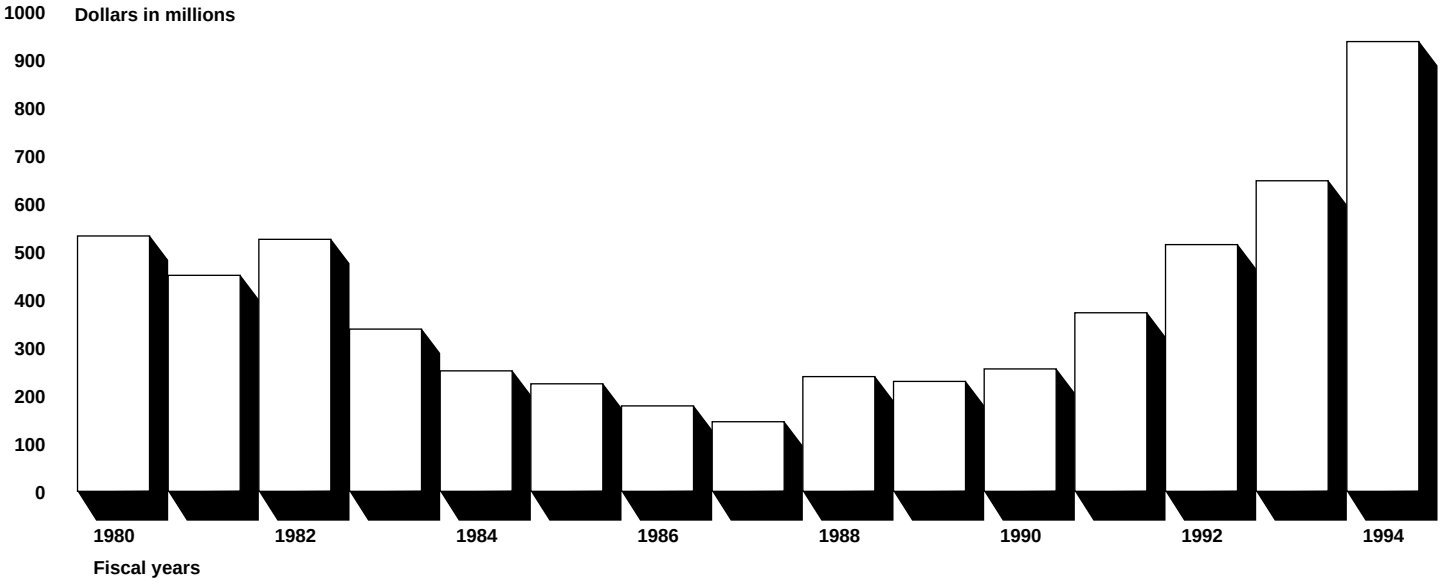
In the 1960s and 1970s, TVA and many other utilities shared the belief that nuclear power could supplement or even replace much of their power from coal plants. During the 1980s, TVA, like some other utilities, decreased expenditures for capital improvements in its coal and hydroelectric plants in anticipation of its nuclear units coming on line. For example, TVA's

expenditures for capital improvements to its coal plants declined from $522 million in 1980 to $118 million in 1987 (expressed in constant 1994 dollars). Capital expenditures for the hydroelectric plants were also uneven during the 1980s. By the mid-1980s, performance of these plants had severely deteriorated. The age[3] and reduced capital expenditures at TVA's coal and hydroelectric plants began to affect performance. The frequency of unplanned unit outages was high, the availability of units to produce power was low, and, according to TVA, the cost of operating and maintaining these units had reached historically high levels.

Capital Improvement Program Initiated and Expenditures Increased

Recognizing the need to improve the performance and reduce the operating costs of its aging power-producing facilities, TVA in 1991 initiated a modernization program for the coal and hydroelectric plants and increased expenditures for capital improvements for them. Figure 3.4 shows TVA's capital expenditures for coal and hydroelectric plants for fiscal years 1980 through 1994.

Figure 3.4: TVA's Capital Expenditures for Coal and Hydroelectric Generation in Constant 1994 Dollars, Fiscal Years 1980-1994



Source: TVA data.

[3]The average age of TVA's coal and hydroelectric units as of December 1994 was 37 years and 49 years, respectively.

Since 1991, TVA data show an improvement in the performance of the coal and hydroelectric system. According to TVA, the availability of coal and hydroelectric units to produce power has improved, unexpected forced outages have declined, and the cost of producing power has decreased.

Despite recent expenditures and improvements, TVA anticipates that it will still need large amounts of capital to continue to improve and upgrade its coal and hydroelectric plants. TVA has projected these costs from 1995 to 2020. These projections show that annually TVA will need an average of $211 million to $266 million in constant 1994 dollars for capital expenditures for the coal plants and $29 million to $35 million in constant 1994 dollars for capital expenditures for the hydroelectric plants. Over the next 26 years, TVA expects to spend between $5.5 billion and $6.9 billion on coal plant upgrades and from $748 million to $914 million on hydroelectric plant upgrades (expressed in constant 1994 dollars).

Clean Air Act Requires Significant Capital Expenditures for Coal Plants

The Congress passed legislation in 1990 under title IV of the Clean Air Act Amendments to mitigate adverse impacts of acid rain by reducing emissions of sulfur dioxide and nitrous oxides. The amendments will have a significant impact on TVA's coal operations, because TVA is one of the largest coal-burning electric utilities in the country and has one of the largest emissions reduction obligations. The amendments will require substantial expenditures to reduce emissions at several of TVA's coal-fired generating plants. Specific reductions in emissions are required in two phases. Phase 1 compliance was to be implemented by January 1, 1995, and Phase 2 by January 1, 2000. TVA has stated that Phase 1 requirements have been met. TVA's compliance strategy for Phase 2 is a component of its IRP decision-making process.

According to data TVA prepared for its IRP, compliance with the Clean Air Act Amendments is estimated to cost from $1.1 billion to $1.6 billion for fiscal years 1995 to 2015 (expressed in constant 1994 dollars). According to TVA, because not all regulations have been issued, these estimates may not reflect the actual cost of compliance. These costs are in addition to the previously discussed estimates.

TVA Is Protected From Competition in the Short Term

The wholesale electricity market is becoming increasingly competitive. Like other utilities, TVA has taken some steps to remain competitive. However, in the short run, several factors protect TVA from direct competition. For example, TVA has been granted special protections from the competitive market by the Energy Policy Act. Furthermore, TVA's power supply contracts with its distributors require the distributors to give TVA 10 years advance notice before cancelling the contracts. Despite these short-term protections, some of TVA's customers are concerned about the possibility of future TVA rate increases and are actively seeking alternative sources from which to buy less expensive power in the future.

Other Utilities Are Changing to Meet New Competitive Pressures

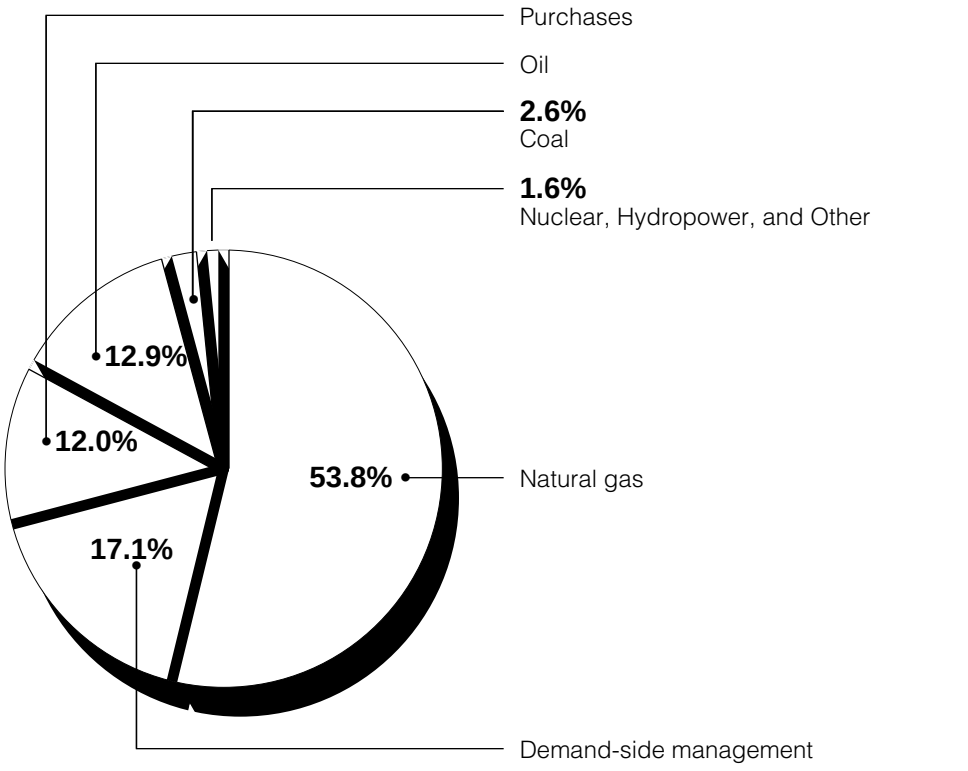
Since enactment of the Energy Policy Act of 1992, electric utilities have taken steps to become more competitive. According to 1994 studies of utility business practices[1] and utilities we contacted, a primary action utilities have taken or expect to take is to satisfy demand by buying power or adding small gas-fired units. Other actions include (1) downsizing staff and restructuring, including merging with other utilities, (2) actively competing on a price basis with other utilities to serve municipal or industrial wholesale customers, and (3) quickly absorbing into the rates or writing off costs associated with uneconomical plants.

Recognizing that demand levels may be uncertain in a competitive market, many utilities are beginning to acquire new kinds of power resources. Some utilities will not commit financial resources to satisfy demand levels projected any further than 5 to 10 years in the future. Many utilities plan to build less in-house capacity and rely more on power purchased from other utilities or IPPs. When adding capacity is necessary, utilities are planning to build smaller units, frequently gas-fired combustion turbines, that are less capital intensive and more flexible resources for satisfying changing demand. These types of units allow utilities to build in relatively small MW increments (for example, 50 MW to 150 MW), at perhaps one-quarter of the cost of larger power plants.

As figure 4.1 shows, the nine IOUs that serve areas near TVA plan to satisfy about 54 percent of additional demand through the year 2003 by building gas-fired plants.

[1] 1994 Electric Utility Outlook, Washington International Energy Group, Washington, D.C., Jan. 1994; and Issues and Trends Briefing Paper: 18 Key Trends Affecting the Electric Utility Industry, Edison Electric Institute, Washington, D.C., May 1994.

Figure 4.1: Plans of TVA's Neighboring IOUs to Satisfy Additional Demand Through 2003



Note: The chart excludes planned capacity purchases and demand-side management savings for specific subsidiaries of the Southern Company and planned capacity purchases for Duke Power.

Source: DOE and utilities' IRPs.

We discussed the evolving competitive market with utilities and utility holding companies that sell electricity near TVA's service area. These entities repeated some of the findings of the surveys mentioned above. For example, according to Virginia Power officials, the utility has taken actions to improve its competitiveness. After cancelling four of its originally planned eight nuclear units, Virginia Power began writing off $500 million in related costs over 15 years. Virginia Power does not plan to build new nuclear units, although it may seek ways of extending the lives of existing units. According to data filed with the Department of Energy (DOE), Virginia Power through the year 2003 plans to meet up to 65 percent

of its additional demand by purchasing energy and capacity, completing two coal-fired baseload units (constituting about 18 percent of expected demand), and implementing demand-side management programs (reducing expected demand by up to 16 percent).

According to company officials, Kentucky Utilities has acquired flexible, low-cost resources; purchased power instead of building baseload units; and trained its workforce to perform several different types of duties, instead of specializing in only one type of task.[2] The utility's existing capacity does not include nuclear assets and is primarily coal-fired (82 percent), with reliance on purchased power (14 percent). According to data filed with DOE, through the year 2003 almost all of Kentucky Utilities' additional requirements will be satisfied by building gas-fired plants of 110 MW to 220 MW. Kentucky Utilities does not plan to build nuclear units.

Officials of American Electric Power, a holding company with about 24,000 MW of capacity that serves areas north of TVA's service area, affirmed that the regional market is becoming increasingly competitive. American Electric maintains low fixed expenses through such actions as quickly writing off expenses associated with cancelled nuclear units and financing its PP&E with cash flow from operations. Although its existing capacity is primarily coal fired (86 percent), with smaller amounts of nuclear (8 percent) and hydro (3 percent), the company plans to satisfy almost all of its additional capacity requirements through the year 2003 by building gas-fired plants, according to DOE.

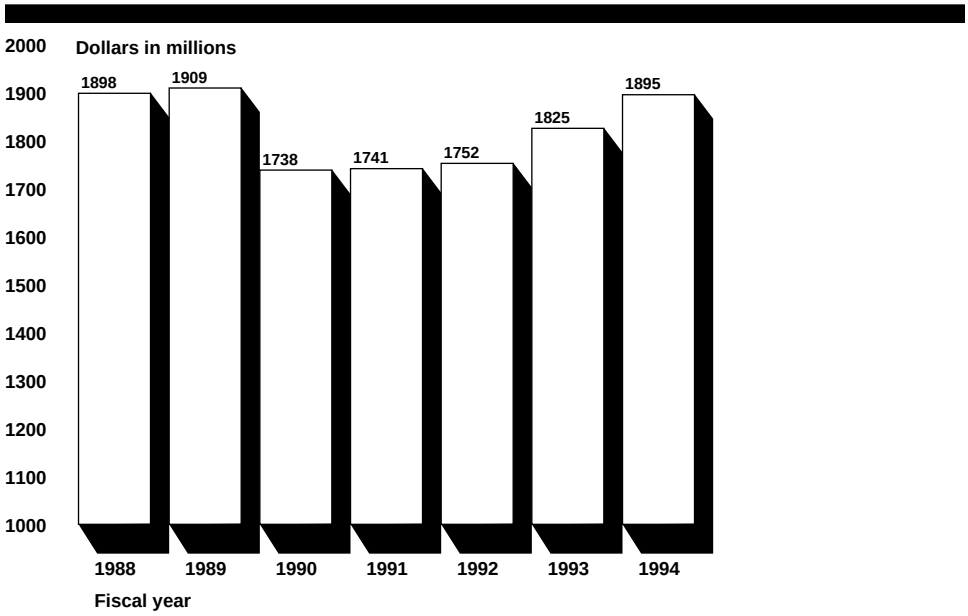
TVA Has Taken Some Actions to Enhance Its Competitiveness

TVA has taken a number of actions in an attempt to maintain competitive rates. TVA estimates that, since 1988, its savings from all cost reduction and efficiency measures total more than $800 million a year. According to TVA, it reduced the size of its workforce by over 50 percent—from about 34,000 in 1988 to about 16,500 in 1995—achieving payroll reductions of about $400 million. TVA also decreased its fuel and purchase power costs through measures that reduced the forced outage rates at power plants ($100 million savings). The remaining cost reductions resulted from debt refinancing during the 1989 to 1994 period ($300 million). Since 1986, TVA's total operating expenses have remained relatively flat. At the end of fiscal year 1994, TVA offered its employees early retirement and financial incentives to leave. TVA stated that this was necessary to reduce operating expenses in order to avoid a rate increase or layoffs in fiscal year 1996.

[2]Kentucky Utilities provides the lowest electricity rates of any of TVA's neighboring IOUs. It has a capacity of about 3,700 MW.

Despite TVA's debt increasing substantially from 1988 to 1994, TVA's refinancing efforts have allowed it to keep its total interest expense fairly level, as shown in figure 4.2.

Figure 4.2: TVA's Total Interest Expense, Fiscal Years 1988-1994



Note: Total interest expense equals the sum of gross interest expense plus the interest on appropriated debt.

Source: TVA's 1988-1994 financial statements.

According to TVA, since 1989 it has refinanced approximately $20 billion in outstanding debt and reduced its average interest rate on outstanding debt from 10.1 percent to 7.3 percent. A majority of the high interest debt that TVA refinanced was owed to the Federal Financing Bank (FFB). As of September 30, 1994, FFB held $3.4 billion of TVA's outstanding long-term debt. See appendix V for more details on TVA's refinancing of FFB debt.

In December 1994, TVA's Chairman announced that the agency planned to place an internal cap on its debt below the $30 billion limit set by the Congress. The announcement came as a result of a study by TVA's Chief Financial Officer concluding that TVA could limit its level of debt from $27 billion to $28 billion by the end of fiscal year 1997. This conclusion

assumed TVA would build no power plants, other than Watts Bar 1 and Browns Ferry 3, unless reductions of equal magnitude were taken in other capital programs. Consistent with this policy, TVA also announced in December 1994 that it would not, by itself, complete the deferred nuclear units at Bellefonte and Watts Bar 2. TVA plans to maintain these units until completion of its Integrated Resource Plan in late 1995. At that time it will consider such alternatives as (1) converting the units to another technology such as natural gas, (2) replacing them with different types of supply- and demand-side resource options, (3) completing the construction of one or more of them as nuclear units in partnership with others, or (4) maintaining them in a mothballed status pending a later decision. As of the end of fiscal year 1994, TVA had invested $6.2 billion in these units and estimated that the cost to complete them could be as much as $8.8 billion more. TVA plans to complete Watts Bar 1 and Browns Ferry 3 and bring the units into commercial service in February 1996.

In August 1994, TVA solicited bids to purchase up to 2,000 MW of additional baseload resources and up to 2,000 MW of additional peaking resources; in December 1994, TVA announced it had received bids totaling 21,800 MW. Also, in February 1995, TVA's Chairman stated that in recognition of evolving competitive markets, legislative provisions that prevent TVA from transmitting and marketing its power outside of its established service area should be eliminated, so that TVA can compete on an equal footing with its neighbors.[3] The Chairman added that the "fence" should come down, "unleashing the agency's potential as a nationally competitive electric utility."

As part of the Chairman's February 1995 announcement, he also stated that TVA had commissioned a study to examine all aspects of removing the fence before seeking necessary legislation. The study's report, released in April 1995,[4] recognized that TVA faces radically different conditions today because of the realities of the rapidly changing electric industry. The report included the following findings.

- The electric utility industry is becoming increasingly competitive and, like other utilities, TVA is making the tough choices to implement a vision and strategy to successfully compete. Specifically, the Board has suspended

[3]The Chairman's announcement, however, did not indicate that TVA wished to remove statutory provisions in the Energy Policy Act of 1992 which generally prohibit other utilities from transmitting power over TVA's transmission network and selling the power to TVA's customers.

[4]The Ties That Bind: TVA in a Competitive Electric Market, Palmer Bellevue, a division of Coopers & Lybrand L.L.P., April 1995.

construction on three nuclear units and completed a 50 percent reduction in its workforce. In addition, the Board has taken steps to control the size and costs of TVA's capital base, including limiting TVA's debt and suspending construction projects. These steps, by 1997, are said to enable TVA both to continue to service its debt and to internally generate the funds necessary for ongoing capital additions to the system. TVA's financial condition is sufficiently flexible and strong for entry into and success in a competitive market—but only if it has the freedom to compete effectively.

- Nationally, electric utilities are implementing market priced wholesale power transactions, open access transmission, diversifying into independent power at home and abroad, and actively pursuing the convergence of energy and communications. TVA is largely prevented from participation in these developments.
- So that TVA can evolve as a fully competitive enterprise and assure its current wholesale power customers a wide range of choices in the future—including supplies from other power generators—the Board is recommended to undertake a two-phase effort to remove the "fence" and related restrictions. Phase 1 would allow TVA to conduct all conventional types of wholesale business with utilities bordering TVA and beyond. During Phase 1, TVA would not be allowed unbalanced access to traditional nonprofit wholesale customers of neighboring utilities, with which TVA's relationship has been severely restricted since 1959 and which cannot serve in the TVA territory under the TVA Act. Phase 2 would remove the "fence" entirely, giving TVA's current wholesale customers free market access and at the same time permitting TVA to seek markets outside the Valley on the same basis that competitors could enter the Valley to provide service.
- TVA's transition to a fully competitive posture is not hindered by an inherent inability to compete on a vigorous and equal basis with others. Instead, the barriers to TVA's competitiveness are largely found in ties to the past and the limitations imposed by unusual and unique provisions in federal law.
- TVA's power program is self-supporting and largely free of federal financial support.

We agree that electricity markets are rapidly changing and TVA will have to compete with other utilities; however, we disagree that TVA's recent actions have positioned it to meet the competitive challenges that lie ahead. Certainly, some of TVA's announced intentions are steps in the right direction. However, the planned actions do not significantly diminish TVA's major problems of paying down its $26 billion of debt, paying financing

costs of about $1.9 billion per year, and including in its electricity rates $14 billion of deferred costs for nonproducing nuclear assets.

The Palmer Bellevue study does not recommend immediately opening the market to full competition. The study recommends that TVA be allowed to sell to customers outside its current service area for an unspecified period while continuing the restrictions that make it difficult for competitors to enter TVA's market. An important issue to consider in analyzing the study's recommendation is the equity of a proposal that solely benefits TVA to the potential detriment of TVA's competitors.

We also believe that other issues will affect TVA's competitiveness. For example, TVA's high debt and resultant financing costs severely limit its ability to cut rates in response to competitive pressures or to invest in new technologies that may decrease its costs of generating electricity. Under one scenario, in a competitive market, if TVA charges rates above the market-based rates of other utilities, TVA's distributors could give notice and leave the TVA system at the end of 10 years (or sooner if contracts can be renegotiated) to buy power from cheaper sources. That would leave a dwindling number of TVA distributors and customers to pay off the substantial debt that TVA has accumulated from previous years. Under another scenario, TVA could try to compete by selling power at market rates, even if they were below TVA's generating and financing costs. However, in our view, TVA could maintain these rates for only a limited time.

TVA's power program is required to be self-financing; nevertheless we disagree that the program's finances are primarily separate from the federal government. The government has a great financial interest in ensuring that TVA is a going concern and that its debt becomes manageable, because $4.2 billion of TVA's debt is owed directly to the government. In addition, the remaining $22 billion of debt, primarily in the form of publicly held bonds, is perceived by the financial community as having an implicit federal guarantee.

In the Short Run, Several Factors May Protect TVA From Competition

Despite TVA's large outstanding debt and problems with its nuclear program, several factors may allow TVA to remain financially viable over the next decade. First, TVA is currently protected from competition by special provisions in the Energy Policy Act, as well as by the stringent cancellation requirements in its power contracts. Second, the departure of some of TVA's industrial load in the 1980s left behind a remaining customer

base that is much less responsive to rate increases, because it is less able than industry to take advantage of alternative and cheaper sources of power. And third, in the short run, because of tight capacity margins or transmission costs, some low-cost competitors may not be able to sell power to TVA distributors.

Statutory and Contractual Provisions May Minimize the Impact of Competition on TVA

In the short run, TVA is shielded from competition by statutory and contractual provisions. In 1959, the Congress amended the TVA Act to freeze TVA's service area as it existed in 1957. This restricted TVA's ability to compete with neighboring utilities. Conversely, in the Energy Policy Act of 1992, the Congress safeguarded the integrity of TVA's service area from lower cost producers in the Southeast by restricting their sales to TVA's distributors. FERC cannot compel TVA to provide transmission services to another utility if the electricity to be transmitted will be consumed within TVA's service area, with the exception of Bristol, Virginia.

TVA's wholesale power supply contracts also restrict the ability of TVA distributors to buy electricity from other utilities. According to TVA contracting officials and TVA distributors, until the late 1980s, TVA distributors signed contracts which required them to satisfy all of their power needs by buying from TVA. These contracts contained 20-year terms, but after 6 years of service had elapsed, distributors could cancel them by giving TVA 4-years advance notice. However, in 1989, after the city of Memphis began seeking other sources of power, TVA revised its contracts with distributors to increase the cancellation notice period from 4 years to 10 years. Specifically, the new contracts automatically renew each year and require TVA's distributors to give 10 years advance notice before cancelling TVA's services. The contracts continue to require that distributors satisfy all of their power requirements by buying from TVA. According to the Tennessee Valley Public Power Association (TVPPA), which represents most of TVA's distributors, and individual TVA distributors that we contacted, these terms severely limit a distributor's options to buy from cheaper sources. If a distributor chooses to break its contract, it is subject to monetary penalties specified in the contract. TVA officials said, however, that no distributor has broken its contract.

Utilities that are low cost and able to deliver power to the TVA service area may be frustrated, at least in the short run, by TVA's contractual and statutory protections. American Electric officials stated that its subsidiaries are low-cost producers who are willing and able to supply TVA's larger distributors with power. American Electric has power to sell to

TVA's largest distributors and industrial customers; its all-time peak demand, said company officials, equals about 19,000 MW of a total capacity of about 24,000 MW. However, TVA's statutory and contractual provisions prevent American Electric from selling power to almost all of TVA's distributors.

Reductions in TVA's Industrial Customers Resulted in a More Stable Load

TVA has a relatively stable load consisting primarily of residential and commercial customers. According to representatives from TVA, distributors, and industry, the presence of a large industrial load within a service area indicates a large amount of potential change in a utility's load. Because electricity rates are a significant cost for many industrial customers, the larger industrial entities are willing and able to leave a utility's service area to find alternative, cheaper sources of power. According to officials of the Electricity Consumers Resource Council (referred to as ELCON),[5] the cost of electricity for such industries as aluminum smelters, glass, chemicals, and chlor-alkali, can equal from about 30 percent to 40 percent of production costs.

According to representatives of TVA's directly served and distributor-served industrial customers,[6] TVA's industrial rates were increasing at double-digit rates each year in the 1970s. For example, according to these officials, TVA's industrial rates increased by 22 percent in 1971, 38 percent in 1975, and 46 percent in 1976. According to their analysis, TVA's basic industrial rates went from an average 0.9 cents per kwh in 1970 to over 4.0 cents per kwh in 1983. In response, industries closed or moved many plants. TVA's sales to industrial customers declined from about 25 billion kwh in 1979 to about 16 billion kwh in 1993. According to TVA officials, because of this loss of industrial customers, TVA's load today is more stable than it otherwise would have been. The increase in load stability decreases the possible adverse short-term impact of competition on TVA's electricity sales and revenues.

Low-Cost Competitors May Not Be Able to Sell Power to TVA Distributors

Some low-cost competitors may not be able to deliver power into the TVA area at a competitive price because transmission charges levied by intervening utilities would make the cost of the power noncompetitive.

[5]ELCON is the national association of large industrial customers. They buy about 4 percent of the nation's electricity.

[6]These associations include the Tennessee Valley Industrial Coalition (represents directly served TVA industrial customers) and the Associated Valley Industries (represents distributor-served industrial customers in the TVA service area).

For example, Virginia Power officials stated that the utility's rates are competitive with TVA's rates, but the utility is not now, nor will it be in the foreseeable future, in direct competition with TVA. The officials said that to sell power to TVA's distributors, Virginia Power's electricity must be transmitted through Appalachian Power's service territory to the interchange between Appalachian Power and TVA near Bristol, Virginia. According to Virginia Power officials and our analysis of data they provided to us, Appalachian Power's transmission tariff of $2 per kilowatt month plus an energy charge of $1 per megawatt hour[7] may increase the delivered cost of Virginia Power's electricity by about 10 percent.[8]

A cost-competitive utility that may be willing to sell power to TVA's customers may be limited by a lack of capacity. For example, a Kentucky Utilities official stated that because Kentucky Utilities operates under a relatively small capacity margin of 15 percent, the company cannot serve TVA's larger customers. At the present time, it could only serve TVA's smaller distributors (generally those with loads of about 100 MW or less).

TVA's Customers React to Evolving Markets

TVA's distributors and remaining industrial customers are concerned about potential rate increases and are reacting cautiously. Some distributors told us they wish to modify their contracts with TVA to buy some or all of their power from other suppliers. Industrial representatives said that industrial customers currently benefit from special TVA rates, but TVA needs to reduce its rates more if it wishes to be competitive with the low-cost providers of power in the region.

Distributors' Concerns About TVA's Rates Have Led Some to Seek Options to Buy Power From Other Sources

Concerns about TVA's rates have caused some distributors to consider buying power from sources other than TVA. For example, in the late 1980s, the city of Memphis's Light, Gas, and Water Division explored the possibility of buying power from sources other than TVA. Memphis analyzed the prospects for TVA's future rates, given assumptions about such factors as TVA's nuclear program and future electricity load. At the optimistic end of its analysis, Memphis projected that TVA's overall wholesale rates would decline in real terms from 4.3 cents per kwh in 1989 to 4.0 cents per kwh in 2010 (expressed in 1988 dollars). At the pessimistic end, Memphis projected that TVA's average wholesale rates would almost

[7]Transmission tariffs are approved by FERC.

[8]This analysis is based on a hypothetical arrangement to deliver 100 MW of capacity for a year, assuming a load factor of 60 percent. The hypothetical charge for bulk power, excluding the transmission tariff, includes a capacity component of $8.50 per kilowatt month and an energy component of $30 per megawatt hour delivered.

double in real terms to 8.2 cents per kwh in 2010 (expressed in 1988 dollars). Memphis's pessimistic analysis was based on assumptions that TVA's nuclear program would continue to experience cost overruns, complications, and delays. Ultimately, Memphis, which represents over 10 percent of TVA's load, decided to stay in TVA's system because TVA addressed the city's concerns. For example, TVA compensated the city for operating its own transmission system by providing a credit.

In May 1990, the city of Bristol, Virginia, gave TVA written notice that it intended to cancel its power contract effective June 30, 1995.[9] To keep Bristol as a customer, TVA offered Bristol an extension on its existing contract through 1997. TVA also offered the city special rates for industrial customers, as well as other concessions. The city agreed to extend its existing terms, and according to Bristol officials, several industrial customers have recently saved over $80,000 per month because of the new industrial rates. Once its contract with TVA expires, Bristol can purchase power from utilities other than TVA. Bristol received an exemption in the Energy Policy Act of 1992 that allows other utilities to transmit their electricity to Bristol over TVA's power lines. According to its General Manager, Bristol plans to solicit bids during the summer of 1995 for electricity to be delivered in 1997.

The Four County Electric Power Association near Columbus, Mississippi, notified TVA in December 1993 of its intent to cancel its power contract. After analyzing TVA's financial statements, Four County's Chief Executive Officer became convinced that TVA's nuclear fixed costs are "uncompetitive." Four County officials said that according to a study they commissioned, TVA's wholesale rates may increase by 30 percent over a 10-year period. They said their study analyzed TVA's current and future rates, along with the rates of such utilities as Mississippi Power and Light, Mississippi Power, and Alabama Power. However, because Four County is subject to the 10-year cancellation provisions in its contract with TVA, it cannot stop buying power from TVA until 2003 without risking legal action. Furthermore, under the Energy Policy Act of 1992, TVA cannot be compelled by FERC to transmit through its transmission system the electricity of another utility to Four County. Four County officials believe that it will be able to finance the construction of power lines into its service area, thus tying the cooperative into the power grid of other utilities. In August 1994, Four County requested competitive bids from other electric utilities, IPPs, and power marketers, to provide it with 175 MW

[9]Bristol's existing contract with TVA, signed in 1985, allows Bristol to terminate TVA's services not earlier than 10 years after the contract was signed with a 4-year advance notice requirement, according to Bristol's General Manager.

of power and received 22 proposals totaling 2,000 MW. By buying power from sources other than TVA, Four County expects to reduce its power costs by about 25 percent.

Officials we spoke with from TVPPA said TVA's rates and service reliability must remain competitive with the rates and services of neighboring utilities and regional IPPs. If not, distributors may seek alternative sources of power because they are under pressure from their customers to charge low rates. According to TVPPA officials, some TVA distributors believe that, because of changes brought by the Energy Policy Act of 1992, their contracts with TVA should be renegotiated. TVPPA and some of its members (including some of TVA's largest distributors—Memphis, Nashville, Knoxville, and Huntsville) favor renegotiating TVA's contracts to allow them the option to buy from other utilities and IPPs, as well as TVA, and to decrease the length of the 10-year cancellation notice provision.

TVA's Industrial Customers Are Concerned, but Praise TVA's Efforts to Hold Rates Steady

Although officials that represent TVA's remaining industrial customers are concerned about prospects for rate increases, they praised TVA's steps to enhance the agency's competitiveness, such as cutting costs and freezing electricity rates since 1988. They stated that TVA's innovative industrial rate structures have succeeded in keeping TVA's special industrial rates competitive with other regional utilities. The officials credited TVA's interruptible economy power with decreasing some of TVA's industrial rates to about 3 cents per kwh.

However, they are concerned that TVA's commitment to nuclear power may jeopardize TVA's ability to maintain competitive industrial rates. The officials stated that TVA's basic industrial rates need to drop about 9 percent to match TVA's most inexpensive competitors. Because IPPs can today locate power plants near factories and sell power directly to those facilities, competition to provide electric services to industrial customers has intensified. Moreover, TVA's industrial customer power contracts that can be canceled with 2-year to 5-year termination notices are less restrictive than distributors' contracts.

Options for Addressing TVA's Problems

We believe that the enormous size of TVA's debt and resultant financing costs in the long term jeopardize TVA's ability to meet competitive challenges from neighboring utilities, thus placing the federal government at risk for some portion of TVA's debt. TVA's $26 billion in outstanding debt and $1.9 billion of annual financing costs severely limit TVA's future financial flexibility. In addition, TVA is burdened with $14 billion in nonproducing nuclear facilities that have not been included in its electricity rates. Despite a number of actions by TVA in recent years to improve its financial position, including downsizing its workforce and refinancing its debt at lower interest rates, further actions will be necessary.

Resolving TVA's financial problems will be costly and require painful decisions. In this chapter, we discuss a number of options available to TVA and the Congress and highlight issues for consideration in analyzing each option. There may well be other alternatives, and resolving TVA's financial situation likely will require a combination of actions. Our intent is not to present a particular solution to TVA's dilemma; rather, our intent is to stimulate a dialogue among the key decisionmakers concerning options available to protect the government's interests and help TVA fulfill its announced intention of becoming a competitive and financially viable utility.

TVA's Actions, Plans, and Other Options Are Unlikely to Make It Fully Competitive or to Protect Federal Financial Interests

As illustrated in our report, we agree with TVA that it is operating in a rapidly changing environment and that it will have to compete like other utilities in the future. We disagree, however, that TVA's recent actions and announced plans put it in a strong position to meet the competitive challenges that lie ahead. In contrast, we believe that because of TVA's substantial debt and resultant financing costs, it is doubtful that TVA will be able to compete successfully in the long run.

TVA's steps to reduce operating costs and interest expense, while commendable, may be insufficient. These actions, which according to TVA have resulted in $800 million in annual savings, have helped TVA to keep its rates stable and remain competitive. However, because of the size of operating cost savings already achieved, it is unclear whether further significant reductions are available.

Likewise, TVA's plan to stop borrowing when its debt reaches $27 billion or $28 billion, while a step in the right direction, will not resolve TVA's debt problem. To accomplish this goal, TVA will have to substantially reduce its

capital expenditures. In fiscal year 1994, TVA borrowed $900 million because its capital expenses ($2 billion) exceeded its cash flow from operations ($1.1 billion). According to TVA's 1994 annual report, new borrowing is estimated to be $1 billion for 1995 and $500 million for 1996. During fiscal year 1994, TVA spent approximately $2 million per day on its Watts Bar 1 and Browns Ferry 3 nuclear units, which represented approximately 40 percent of TVA's total capital expenditures. This construction activity continues to increase TVA's debt, financing costs, and deferred assets. Construction activity and the potential for future operating problems at these two plants increase TVA's operating, financial, and competitive risks. Given TVA's history of construction cost overruns at Watts Bar 1 and Browns Ferry 3, along with the tremendous capital requirements of its aging coal and hydroelectric plants,[1] staying within its internal debt limit will be difficult.

Assuming that TVA does limit its debt to the $27 billion or $28 billion level, it still faces annual financing costs of almost $2 billion. This financing cost places TVA at a competitive disadvantage with its neighboring utilities and makes TVA highly subject to interest rate fluctuations. In 1994 TVA's financing costs represented 35 percent of its revenues, whereas neighboring IOUs' financing costs averaged only 16 percent of their revenues. Further, neighboring IOUs' fixed financing costs averaged only 8 percent compared to 35 percent for TVA. We believe this difference in fixed financing costs makes it doubtful that TVA can lower its rates to match the projected decrease in industry rates.

TVA's current electricity rates do not include $14 billion of costs for nonproducing nuclear assets, which TVA considers to be construction in progress. Compared to other utilities, the dollar amount and length of time of TVA's deferral are unique. In contrast, IOUs absorb into their rates or write off in a much shorter time frame costs associated with uneconomic plants. If TVA began to amortize and depreciate its deferred assets according to its current amortization/depreciation schedules, its revenue requirements would increase by about $454 million per year for at least 22 years. If all of these costs had been included in TVA's electricity rates in 1994 and TVA had not been able to offset the costs by reducing other expenses, TVA's rates would have been increased by 9 percent which would have decreased TVA's competitiveness compared to neighboring utilities.

[1]For example, TVA anticipates spending from $240 million to $301 million per year (constant 1994 dollars) over 26 years for improvements to its hydroelectric and coal plants.

We believe that the $6.2 billion of costs associated with the three mothballed nuclear units (Watts Bar 2, and Bellefonte 1 and 2) does not represent a viable construction project because of the following factors. First, these three units have not had significant construction activity for nearly 7 years. Second, TVA recently stated that it will not complete these units by itself. TVA lacks the available capital to complete these units given its commitment to cap its debt at $28 billion. Third, in a preliminary draft of its IRP, TVA stated that it will continue to defer a final decision on Bellefonte 1 and 2 for up to 2 more years, while studying an option to convert the units to alternative fuel sources. Fourth, under all of the strategies except one in the preliminary draft of the IRP, TVA will defer a final decision on Watts Bar 2 until the year 2000, at which time it will likely cancel the unit. Given these factors, in our judgment, it is no longer reasonable for these costs to be deferred from current revenue requirements. Generally accepted accounting principles (GAAP) require these costs to be reclassified from construction in progress to "regulatory assets" and amortization begun immediately.[2]

Although TVA's Board of Directors has announced plans to keep electricity rates stable through 1997, TVA could consider a rate increase. With the additional cash generated from operations, TVA could reduce its borrowing or pay down its debt. Because of TVA's management autonomy, no outside approval would be needed. If TVA raised its electricity rates, certain issues would need to be considered, including the impact a rate increase might have on TVA's competitive position. In analyzing this, we found that assuming all other factors remain constant,[3] a one-time rate increase of 10 percent could allow TVA to pay off about $5 billion of debt over 10 years. This would still leave TVA with an outstanding debt of about $23 billion and with substantial annual financing costs. In addition, TVA's customers could respond to a rate increase by consuming less electricity, thereby offsetting some of the revenue that TVA could derive from its rate increase.

A rate increase in a competitive environment also could cause many of TVA's remaining industrial customers to shut down their plants and move their operations or to cogenerate or buy power from other electricity generators. In addition, TVA's distributors could react by giving notice and leaving the TVA system after giving TVA the required 10-year notice (or

[2]Statement of Financial Accounting Standards No. 71, Accounting for the Effects of Certain Types of Regulation.

[3]This example assumes that TVA brings Watts Bar 1 and Browns Ferry 3 into commercial operation and freezes its debt at about $28 billion; and that items such as fuel costs remain the same and ratepayers stay in TVA's system due to TVA's legislative and contractual protections.

sooner if the contracts could be renegotiated) to buy power from cheaper sources. One TVA distributor recently solicited bids from other suppliers and told us it expects to reduce its power costs by as much as 25 percent. If TVA's distributors or other customers leave, a dwindling number would be left behind to pay off the substantial debt that TVA has accumulated from previous years. With fewer customers, there could be pressure to further increase rates and this, in turn, could cause more customers to seek other sources of electricity.

Oversight of TVA's management decisions, similar to that provided to other utilities, might have resulted in different decisions than TVA has made to date. Other than its $30 billion statutory debt ceiling, TVA is subject to essentially no external oversight when deciding what kinds of electricity generating facilities to build, how much debt to incur, and what electricity rates to charge. Other utilities are subject to the scrutiny of independent boards of directors, public utility commissions, and the financial community. It is doubtful that a public utility commission would have allowed TVA to indefinitely defer from rates billions of dollars of construction costs. Moreover, because TVA is a government corporation, the financial community views TVA's bonds as having an implicit federal guarantee. TVA's "AAA" bond rating and resultant easy access to credit has relieved it from needing to exercise the same degree of financial restraint as other utilities.

Because of TVA's high fixed costs and impending competition, we believe the federal government may be at risk for some portion of TVA's $26 billion debt. Of this amount, $3.9 billion is owed directly to the government. The remaining $22 billion of debt consists primarily of publicly held bonds.

TVA does not face a cash flow problem today only because it has nearly $4 billion of remaining authority to borrow for its capital needs. Also, in the short run, TVA is protected from competition by statutory provisions and the 10-year cancellation provisions in its power contracts with distributors. However, TVA could face cash shortfalls in the future if its capital expenditures continue to exceed its net cash from operations by nearly $1 billion per year.

Options for Congressional Consideration

For TVA to be competitive in the long term, we believe it needs, among other things, to reduce its financing costs to levels that are similar to neighboring IOUs. Since TVA's financing costs are approximately double those of the neighboring IOUs, for TVA to have comparable financing costs, it would have to reduce its debt by an estimated 50 percent—$13 billion.[4] It is unlikely that TVA can do this on its own. Some form of federal government intervention may be required.

There are various options for the Congress to consider to reduce risk to taxpayers as well as help prepare TVA to compete in the electricity market. Among others, these options include allowing TVA to try to manage its way through this situation (the "no action" option), limiting or restructuring TVA's debt, removing statutory barriers to competition, privatizing TVA, or increasing oversight of TVA's activities.

The "No Action" Option

One option available to the Congress is to allow TVA to continue operating as it has done in the past to see if it can survive in a competitive market. This option would allow TVA to continue to make the decisions it deems appropriate, postponing for a few years a decision on congressional intervention until a determination is made as to whether TVA's actions have improved its competitive position.

Under this option, market forces could be allowed to run their course, and if TVA could not make bond interest payments, then the bondholders would have to absorb the losses. This alternative could allow for restructuring of debt through agreements reached between TVA and the bondholders. However, if such agreements could not be reached, the financial market perceives that the federal government would prevent any default by TVA on its bonds. It could be argued that such a default may call into question the government's financial backing of other federally-related organizations. For instance, the total outstanding borrowing of government-sponsored enterprises was about $1.5 trillion at the end of fiscal year 1994. This alternative also raises the question of whether it would be considered equitable to allow a default on investments by mutual funds, pension funds, and insurance companies. These investors may have been attracted by TVA's "AAA" bond rating, which is based on TVA's perceived relationship with the government and not on its financial condition.

[4]This estimate is presented only for illustrative purposes. It assumes that all of TVA's debt has the same interest rate as TVA's current average annual rate of 7.4 percent. Thus, all reductions of debt would have an equal impact on TVA's financing costs.

Important issues to consider under this option would be whether (1) adequate assurances are provided that TVA will aggressively address its serious financial problems and (2) TVA's planned reductions in costs and capital expenditures go far enough. The potential risk with this option is that TVA's financial condition could worsen, increasing the risk to the federal government.

Limiting or Restructuring TVA's Debt

The Congress could reduce TVA's current $30 billion statutory debt limit or restructure TVA's debt. As mentioned in our 1983 report,[5] the current statutory debt ceiling for TVA could be reduced from $30 billion to a lesser amount. For example, it could be reduced to the $27 billion to $28 billion self-imposed ceiling that TVA has announced, or even to a lesser amount. Decreasing the debt ceiling could force TVA to make difficult decisions about its capital and operating expenses. It should also be recognized that limiting its debt could adversely affect TVA's competitiveness by limiting its ability to borrow money to finance needed improvements to its power system.

TVA's debt could be restructured under several different alternatives.

- TVA's $3.9 billion debt owed to the federal government and the interest on that debt could be forgiven. This action would immediately reduce TVA's debt and financing costs and help it to become more competitive. However, this action could set a precedent which may encourage TVA to make management decisions that could further increase its debt. In addition, taxpayers who received no benefit from TVA operations would be asked to pay for TVA's management decisions of the last several decades.
- The government could explicitly guarantee TVA's bonds in exchange for the bondholders accepting lower interest rates and longer repayment periods. Under this arrangement, the bondholders would bear some of the costs for TVA's financial problems.
- The government could pay off all or some of TVA's remaining $22 billion of debt and then require TVA to repay the debt at lower interest rates. This option would immediately reduce TVA's financing costs and improve its financial viability and competitiveness. However, this alternative would entail substantial financial costs to the taxpayer.

TVA's annual borrowing/financing activities are included in the federal deficit. To the extent that TVA's capital and operating outlays exceed TVA's

[5]Triennial Assessment of the Tennessee Valley Authority—Fiscal Years 1980-1982 (GAO/RCED-83-123, April 15, 1983).

collections from power revenues, the federal deficit is increased by that amount. Because TVA's $26 billion of outstanding debt financed its capital outlays, the entire debt balance has already been included in previous years' calculations of the federal budget deficit. Restructuring TVA's debt as described above could either reduce the federal government's interest income or increase its interest expense. Thus, depending on the extent of federal intervention, the annual cost to the government for restructuring TVA's debt would be a portion of TVA's financing cost, which in 1994 was $1.9 billion.

Removing Statutory Barriers to Competition

The statutory provisions in the Energy Policy Act of 1992 that exempt TVA from having to wheel the power of other utilities to its distributors could be repealed. In such an event, FERC could compel TVA to transmit the power of such low-cost utilities as Kentucky Utilities or American Electric Power into TVA's service area for sale to TVA's distributors. As a matter of reciprocity, TVA could also be allowed to sell its power to the customers of other utilities. Although TVA's distributors would still be required by TVA's contracts to buy power from TVA for some period of time, distributors that gave cancellation notices would be able to buy power from other sources 10 years after giving the notice. Under this scenario, all of TVA's distributors would have a choice of utilities from which to buy power, thus introducing full competition at the wholesale level to the TVA service area.

Removing the "fence" and other restrictions and exposing TVA to competition would be consistent with competitive and less regulated markets. TVA would have to operate with increased discipline in response to competition and other market forces. However, it could be argued that TVA would enjoy some advantages not available to IOUs because TVA pays no federal taxes and has access to low-cost financing because of its status as a government corporation. Despite these advantages, given TVA's current financial condition, TVA would likely be unable to compete with its neighboring utilities in the long term. If that proved to be the case, the bondholders would be at risk of TVA's defaulting on its bonds unless the Congress intervened.

Privatizing TVA

Another option involves "privatizing" TVA—that is, selling TVA in its entirety, or breaking it up and selling off individual assets. Such a move could reduce future risk to taxpayers while subjecting TVA fully to market conditions. However, TVA's dams and reservoirs serve multiple purposes,

such as flood control, navigation, and recreation. These purposes would have to be considered in any privatization effort.

Because of TVA's $26 billion debt, it is very unlikely that anyone would want to buy TVA in its entirety. Therefore, it is more likely that TVA's assets would be sold and the net proceeds of the sale used to pay down all or part of TVA's debt. There may be willing buyers for TVA's transmission system and coal and hydroelectric plants. However, it is doubtful that anyone would buy TVA's nuclear plants, because of their troubled history and future decommissioning costs.[6] In recent congressional testimony, the Chairman of TVA's Board discussed the potential privatization of TVA and stated, "And so I think you would find the situation in which some people would like to come and buy some of the plants, take the cream and leave the skim to the taxpayers. The taxpayers would end up, I believe, in a bailout situation involving the nuclear program."

We did not assess the market value of TVA's assets. However, because $14 billion of TVA's total of about $32 billion in assets are nonproducing, it is possible that privatizing TVA and selling its assets would not pay off all of its debt.[7] As discussed above, any shortfall would negatively impact the federal deficit because the interest expense associated with any remaining debt would be borne by the federal government.

Increasing Oversight of TVA Activities

The management decisions that placed TVA in its current financial condition were made without any external oversight or review. Providing TVA with greater external oversight may help ensure that its decisions protect the financial interests of the federal government, ratepayers, bondholders, and other stakeholders. Also, establishing strengthened external oversight for TVA's decision making could provide a forum for considering a broader range of options to resolve TVA's financial problems.

At the same time, providing oversight of TVA's management could entail the costs and burdens associated with a new layer of bureaucracy. Establishing a regulatory or oversight body runs counter to the current trends in the electricity industry—specifically, promoting competition between utilities in wholesale transactions and prices. It should also be

[6]In its Integrated Resource Plan, TVA estimates that the decommissioning costs for its nuclear power plants will range from $200 million to $700 million each. TVA projects that the medium cost estimate will be $300 million to $350 million per unit in 1994 dollars.

[7]Whether the proceeds from the assets sold would be sufficient to pay off all of TVA's outstanding debt depends on numerous assumptions and analyses that were not part of the scope of our review of TVA.

noted that oversight by itself does not ensure that utilities make sound business decisions. Many utilities that are regulated by public utility commissions still experienced financial problems stemming from overbuilding nuclear plants during the 1970s and 1980s.[8]

Following are several oversight options.

- TVA's wholesale rates could be placed under FERC's regulatory authority. FERC already regulates the wholesale rates of IOUs, as well as those of some publicly-owned utilities such as the Bonneville Power Administration. However, FERC's regulation of rates is limited to examining and approving the "reasonableness" of the wholesale rates that a utility proposes. That might not provide the detailed level of oversight needed to ensure that TVA's financial and resource decisions are consistent with paying down its debt and becoming more competitive. Providing a more detailed level of regulatory oversight of TVA could result in expanding FERC's mission.
- A regional planning council, with representatives from key regional and industrial stakeholders, could be established. The Northwest Power Planning Council, for example, was created by the Congress to emphasize local control of resource development and power planning. The Council, with representatives from all affected Northwestern states, develops a regional plan. All Bonneville Power Administration proposals involving major resources must be found consistent with the Council's plan. If a proposal is found to be inconsistent, then Bonneville must get specific congressional authorization for the proposal. By establishing such a council, TVA could be made accountable to the people of the Tennessee Valley for the actions it takes to meet the power needs of residents and industry.
- As suggested by the Southern States Energy Board, TVA's 3-member Board of Directors could be expanded to include more members to represent the interests of residents of the service area and other stakeholders, such as the federal government. Unlike the current Board, an expanded Board would not be part of the day-to-day management of TVA's operations, thereby providing more independent oversight. This alternative would avoid instituting a new bureaucratic structure. At the same time, because TVA has no stockholders who could hold an expanded Board accountable, it is possible that over time that Board could adopt similar policies and make the same types of decisions as TVA's 3-member Board has done in the past.

[8]Electricity Supply: What Can Be Done To Revive the Nuclear Option? (GAO/RCED-89-67, March 23, 1989).

- A federal public utility commission could be established to formally review and approve TVA's rate and resource decisions. Again, stakeholders—such as the federal government—that are affected by TVA's financial decisions could be represented on this commission. Like a state public utility commission, a federal commission would have authority to approve or disapprove TVA's rate and resource decisions.

Agency Comments and Our Evaluation

In commenting on a draft of this report, TVA strongly disagreed with our assessment in many areas. In addition, TVA stated that in its opinion, the report was inaccurate in the analysis of TVA's financial condition and made inappropriate comparisons to IOUs. TVA's comments fell into five general areas—capital structure and debt issues, competitiveness, deferred assets, cash flow, and options. TVA also enclosed comments on the draft from Palmer Bellevue, an affiliate of Coopers & Lybrand. Our response to TVA's comments related to the five general areas and the Palmer Bellevue comments follows.

Capital Structure and Debt

TVA states that we fault it for having too little equity and that we inappropriately compared it with neighboring IOUs. TVA maintains that its capital structure is different from that of IOUs, its capitalization is not out of line with other utilities, and its debt does not place taxpayers at risk or keep TVA from being competitive. We disagree with TVA's conclusions. In chapter 2, we recognize that TVA's only option for raising external capital is borrowing, while IOUs also issue common and preferred stock. Our report focuses on the financing costs resulting from each utility's capitalization regardless of source. Our ratio of financing costs to revenue accurately reflects the costs of debt, preferred stock, and common stock for TVA and the IOUs. TVA's customers are not concerned about the capital structure of TVA or neighboring IOUs; rather, they are concerned about the rates they are charged, which are directly affected by financing costs. TVA does not address in its comments one of the key issues raised in our report—that TVA's financing costs to revenue ratio is more than double (35 percent for TVA versus 16 percent for IOUs) and its fixed financing costs to revenue ratio is more than 4 times greater (35 percent for TVA versus 8 percent for IOUs) than the average of comparable ratios of neighboring IOUs. We believe that the enormous financing costs resulting from TVA's $26 billion debt severely limit TVA's flexibility and makes it doubtful that TVA can compete with neighboring IOUs in the long term, placing the government at risk for some portion of TVA's debt.

TVA states in its comments that based on total capitalization, TVA is not out of line with IOUs and presents a "Market Value Capitalization Comparison" chart as of December 31, 1993, to illustrate this point. We believe that capitalization per megawatt shown on this chart is not relevant because it is not indicative of future revenue requirements. In contrast, our calculation of investment in PP&E per megawatt of generating capacity in figure 2.6 shows that TVA has the third highest investment in PP&E per megawatt of generating capacity among the neighboring IOUs—even assuming Watts Bar 1 and Browns Ferry 3 come on line as planned. These investments ultimately must be depreciated or amortized and included in revenue requirements. Although TVA's average system rate is currently competitive, we believe that when TVA brings its nonproducing nuclear assets into revenue requirements, its comparatively high investment, as shown by our calculation, is likely to adversely affect TVA's future competitiveness.

Competitiveness

TVA states: "The bottom line... is that deregulation in the utility industry is here, and that TVA, as a corporation, is ready to compete, not retreat." TVA points to actions taken to date and future plans to improve its competitive position. In chapter 4, we state that these TVA actions are steps in the right direction. Nevertheless, we do not believe that TVA's actions and future plans significantly mitigate the competitive disadvantages created by its substantial financing costs and deferred assets.

Our analysis of the overall competitive situation facing TVA was echoed by Standard & Poor's, a major independent bond rating organization in its May 1995 analysis of TVA's global power bond issue. According to this analysis, "TVA's power program operations are characterized by a high fixed cost burden relating to $27.1 billion of long- and short-term debt outstanding, diverse resource mix, significant challenges remaining under its nuclear program, and higher marginal costs of production than surrounding competitors." In addition, Moody's, another major independent bond rating organization, stated in its analysis of the same power bond issue that without TVA's status as a U.S. agency, "It is highly unlikely, however, that TVA would retain its Aaa bond rating because of, among other things, nuclear risk and an average competitive position."

As further evidence of its competitiveness, TVA cites a study it commissioned, The Ties That Bind: TVA in a Competitive Electric Market (referred to as the Palmer Bellevue study), that concludes that TVA is ready for competition. However, as discussed in chapter 4, the study

recommends that TVA be allowed to sell to customers outside its current service area for an unspecified period while its potential competitors would be prevented from selling to customers within TVA's service area. Creating this "one-way fence" may be viewed as inequitable because neighboring utilities would not be allowed to compete for customers in TVA's service area. It should be noted that taking down the fence would be very complex given TVA's current financial condition and that IOUs already believe that TVA has unfair competitive advantages due to the implicit federal guarantee on its debt and its exemption from federal taxes.

Deferred Assets

TVA states that our analysis misrepresents construction projects in progress as $14 billion in deferred assets. As discussed in chapter 2, we grouped TVA's construction in progress units (Watts Bar 1 and Browns Ferry 3) and deferred nuclear units (Watts Bar 2 and Bellefonte 1 and 2) into a single category called deferred assets. This grouping is entirely appropriate as none of these units generate electricity or produce revenue and, therefore, are excluded from current revenue requirements. Anywhere there was a distinction in accounting treatment, we disaggregated these assets. Regardless of how labeled, these $14 billion of assets, along with TVA's substantial financing costs, will leave it with little flexibility to meet future competition.

TVA also states that we advocate depreciating and/or amortizing deferred assets in violation of GAAP. Throughout the report, we have treated the nearly $8 billion of deferred assets associated with Watts Bar 1 and Browns Ferry 3 as construction in progress that would be depreciated beginning in 1996 when the two units are expected to be brought into commercial operation. We disagree with TVA's position that including amortization of the $6.2 billion of costs associated with the 3 mothballed units in current revenue requirements is not in accordance with GAAP. On the contrary, we believe that these units no longer represent viable construction projects and that deferral of these costs from current revenue requirements is no longer reasonable. GAAP require these costs to be reclassified from construction in progress to "regulatory assets" and amortization begun immediately.[9]

TVA disagrees that there will be pressure to increase rates as a result of bringing Watts Bar 1 and Browns Ferry 3 into commercial operation. Based on TVA's analysis, annual revenue will increase by $626 million when

[9]Statement of Financial Accounting Standards No. 71, Accounting for the Effects of Certain Types of Regulation.

Watts Bar 1 and Browns Ferry 3 begin operating. TVA's projected annual revenue increase is very optimistic. TVA's analysis assumes that all of the electricity generated by these two units will be sold at current prices. For this to occur, the annual demand for TVA's electricity would need to increase by more than 10 percent by the year the plants come on line. This is extremely optimistic given that TVA's own load forecast shows that electricity demand will grow by 2.4 percent per year through the year 2003. If TVA's first-year demand increases by its projected 2.4 percent, then revenue from increased sales within its service area (assuming no rate increase) would only be about $130 million. The rest of the electricity would either displace current capacity or be sold on the spot market at, on average, significantly lower prices. In addition, TVA assumes that these 2 units will generate electricity at 75 percent of capacity. TVA's 3 operating nuclear plants have operated at 66 percent of capacity since restart.

We also found that TVA's scenario understates depreciation at Watts Bar 1 by $43 million. TVA officials stated that its analysis reallocated nearly $1.5 billion in costs from Watts Bar 1 to Watts Bar 2. As discussed, TVA has deferred until at least the year 2000 decisions about canceling Watts Bar 2, and hence continues to defer amortizing the costs associated with the unit indefinitely. As stated earlier, we believe that the costs associated with Watts Bar 2 should no longer be deferred and should be amortized along with the other two mothballed units, increasing current revenue requirements by $207 million, assuming a 30-year amortization period. It should be noted that using a 15-year amortization period, which would be more consistent with IOUs, would increase revenue requirements by $414 million per year.

Cash Flow

TVA states that it generates more than enough cash to fund ongoing operations and service its debt. The fact that TVA borrowed $900 million in 1994 and plans to borrow $1 billion in 1995 shows that it does not currently generate sufficient cash from operations to finance its capital expenditures.

TVA maintains that once Watts Bar 1 and Browns Ferry 3 are completed, its need for capital will decrease significantly. We generally agree that completion of Watts Bar 1 and Browns Ferry 3, assuming all other factors remain constant, would reduce TVA's capital needs significantly; however, the funding needed to continue work at these two units continues to increase TVA's debt. Information previously developed by TVA demonstrates this point. For example, TVA's December 1994 Report on Controlling the

TVA Debt projected that from fiscal year 1995 through 1997, TVA's capital expenditures would exceed net cash from operations by a total of about $1.7 billion. As a result, TVA forecast that its outstanding debt would reach about $27.6 billion by the end of fiscal year 1997. TVA reiterated this point in February 1995 congressional testimony when it estimated that its total debt would increase by $1 billion in fiscal year 1995 and an additional $585 million in fiscal year 1996.

Options

TVA states that few utilities operate under as much oversight and scrutiny as TVA, adding that the marketplace conducts the toughest oversight possible. Moreover, TVA states that to compete effectively in this competitive business environment, it must be free to make sound business decisions to meet the needs of its customers.

We disagree with TVA's conclusion that it operates under intense scrutiny and oversight. TVA can set its own rates and reach whatever resource decisions it wants with little external scrutiny and without approval from parties, such as state public utility commissions, boards of municipal governments or customer-owners, independent boards of directors, or stockholders. Furthermore, TVA faces only limited oversight from the financial marketplace because the bond market grants TVA's bonds the highest possible rating on the assumption that the bonds are implicitly backed by the federal government. This point was emphasized in May 1995 analyses by Standard & Poor's and Moody's. According to Standard & Poor's analysis, the "AAA" rating on TVA's debt "reflects the implicit support of the U.S. The rating on TVA debt does not reflect TVA's underlying business or financial condition. Implicit support is Standard & Poor's view that the federal government will support payment of principal and interest on certain debt issued by entities created by Congress even though there is no legal obligation to do so."

Resolving TVA's financial problems will be costly and require painful decisions. The various options in our report were meant to stimulate a dialogue among the key decisionmakers concerning options available. We do not present a particular solution to TVA's dilemma; we highlight issues for consideration in analyzing each option and recognize that there may well be other alternatives.

Palmer Bellevue Comments

Palmer Bellevue states that we give "short shrift" to some important issues relating to TVA's competitive position. The Palmer Bellevue comments

relate primarily to the issues of taking down the fence and TVA's production costs. In our response to TVA's comments on competitiveness in this chapter, we clearly explain that what Palmer Bellevue calls for in its study is the creation of a "one-way fence," followed at some future date by full competition. We believe this is an unrealistic and very unlikely scenario.

Palmer Bellevue states that we ignore its conclusion that TVA is a low-cost producer of electricity when compared to neighboring utilities. Palmer Bellevue states that comparing TVA's incremental and average cost of production to neighboring utilities shows that TVA is in a relatively strong position. Because Palmer Bellevue's calculation of TVA's incremental and average cost of producing electricity excludes $1.9 billion of annual interest expense and TVA's other fixed costs such as depreciation expense, we believe their analysis is incomplete and presents a misleading view of TVA's competitiveness. Interest expense alone represents over one-third of TVA's total expenses while depreciation is over 10 percent more. In addition, their analysis does not consider the impact of TVA's $14 billion of deferred assets on TVA's future rates and competitiveness. We estimate that inclusion of deferred assets would increase TVA's revenue requirements by 9 to 12 percent. Thus, Palmer Bellevue's incremental and average production cost analysis excludes, at a minimum, over half of TVA's 1994 revenue requirements. We believe that the full cost of producing electricity is more relevant to a utility's current and future competitiveness. A utility cannot sell electricity at incremental costs (or average cost as calculated by Palmer Bellevue) for too long and remain financially viable, especially when it has $14 billion of deferred assets, $6.2 billion of which no longer even represent viable construction projects.

In summary, we remain confident that our analysis is sound and well-grounded, and that we carefully considered trends in the electric utility industry through extensive interviews of key industry representatives and consultants. Appendix III (1) details the overall methodology we followed and (2) lists the numerous organizations and groups we contacted. We have extensive internal control processes to ensure the accuracy of data included in our reports and to be confident that our conclusions are based on those facts. As part of our methodology, we frequently retain industry or other subject matter expertise to achieve the proper reporting perspective and/or to validate our message. We provided copies of a draft of this report to two external reviewers—Charles Luce and Robert Fri. As discussed in appendix III, Mr.

Luce is the retired Chairman of the Board and CEO of Consolidated Edison of New York and former Administrator of the Bonneville Power Administration, and Mr. Fri is President and Senior Fellow of Resources for the Future. In addition, both were members of the Southern States Energy Board Advisory Committee on the Tennessee Valley Authority that issued the 1987 report TVA—A Path to Recovery. The comments received from these reviewers were considered in drafting this report and both concurred with our overall message and conclusions.

TVA also inappropriately concludes several times in its comments that our report was influenced by IOUs. As shown by our methodology described in appendix III, we contacted a much broader range of industry trade groups/associations representing the interests of public power, rural cooperatives, and TVA customers, as well as IOUs. We also contacted relevant federal agencies, bond rating agencies and financial analysts, TVA's auditor, load forecasting experts, and a number of large and small TVA distributors. Consequently, we believe our report provides the Congress with an independent and in-depth analysis of TVA's financial condition and competitive prospects.

TVA's Integrated Resource Planning Process

The purpose of this appendix is to describe TVA's Integrated Resource Planning (IRP) process that is currently underway. The IRP is a process that helps utilities evaluate a variety of supply and demand resources to determine which ones can most cost effectively meet the energy needs of their customers. Until the 1970s, the demand for electricity was strong, and electricity prices were declining. As a result, resource planning in the utility industry was straightforward, consisting primarily of simple trend analyses to forecast the future demand for electricity and plans for the addition of large baseload power plants to meet the demand. During the 1970s and 1980s, the oil embargo, high inflation, and stronger regulatory requirements for nuclear power plants created higher utility costs and forced utilities to increase electricity rates. As a result, the growth in the demand for electricity decreased. Utilities began to realize that because of the uncertainty of future electricity demand, the construction of large power plants may not be the most economical resource option available. As the future demand for electricity became more difficult to predict, the industry began to experiment with more sophisticated planning approaches and techniques. The IRP process has evolved to address the uncertainty about the future growth of electricity demand, as well as other changes in the utility industry, such as the public's increasing concern with the environmental effects of power generation and growing competition from other power suppliers.

The Energy Policy Act of 1992

The Energy Policy Act of 1992 requires TVA to conduct a least-cost planning program[1] for new energy resources that evaluates the full range of existing and incremental resources in order to provide adequate and reliable service to its electric customers at the lowest system cost.

In developing this least-cost plan, the act requires TVA to (1) consider the factors of risk in power system operation, such as the reliability and flexibility of power plants, (2) assess the ability to verify energy savings achieved through energy conservation and efficiency programs and the projected durability of such savings measured over time, and (3) treat demand and supply resources on a consistent and integrated basis. The act also requires TVA to (1) provide an opportunity for its distributors to recommend resource options for inclusion in the IRP, (2) encourage and assist distributors in the planning and implementation of cost-effective energy efficiency options, and (3) provide an opportunity for public review

[1]TVA uses the term Integrated Resource Planning when referring to the least-cost planning process required by the act.

and comments prior to the selection and addition of any major new energy resource.

Unlike TVA's Past IRP Efforts, TVA's Current IRP Includes Public Participation

TVA's past resource planning efforts were primarily internal analyses with little, if any, participation from the general public. TVA's resource planning consisted of an evaluation of the trade-offs between supply-side and demand-side management options.[2] TVA periodically developed resource planning reports primarily to provide analyses to support major resource decisions. For example, TVA's review of its load growth and nuclear plant construction situation in 1982 eventually led to the cancellation of certain nuclear plants. In the 1980's, TVA began to produce long-term resource plans that incorporated the uncertainties of future events. TVA's last resource plan was completed in 1991.

TVA's current IRP process, which TVA calls Energy Vision 2020, officially began in February 1994 and is scheduled to be completed in December 1995. TVA issued a draft IRP plan in July 1995 and plans to issue the final IRP plan in December 1995. The IRP report will provide TVA with (1) a 25-year long-term energy strategy and (2) a 3-year to 5-year short-term action plan, which will identify the initial actions or tasks that TVA will undertake in order to achieve the objectives of its long-term plan. As part of the IRP process, TVA will also prepare an Environmental Impact Statement to evaluate the impacts of TVA's IRP resource decisions. TVA will prepare this statement in accordance with the National Environmental Policy Act of 1969, which requires federal agencies to consider the environmental impact of a new facility or modification of an existing facility.

TVA's stated main objective of the IRP process is to ensure that TVA is competitive with other utilities and energy suppliers throughout the United States in many aspects of its business. These aspects include TVA's electricity rates, quality and value of services, power system reliability, and economic development and environmental efforts. TVA designed its IRP process using two interrelated methods, the technical process and the public participation process.

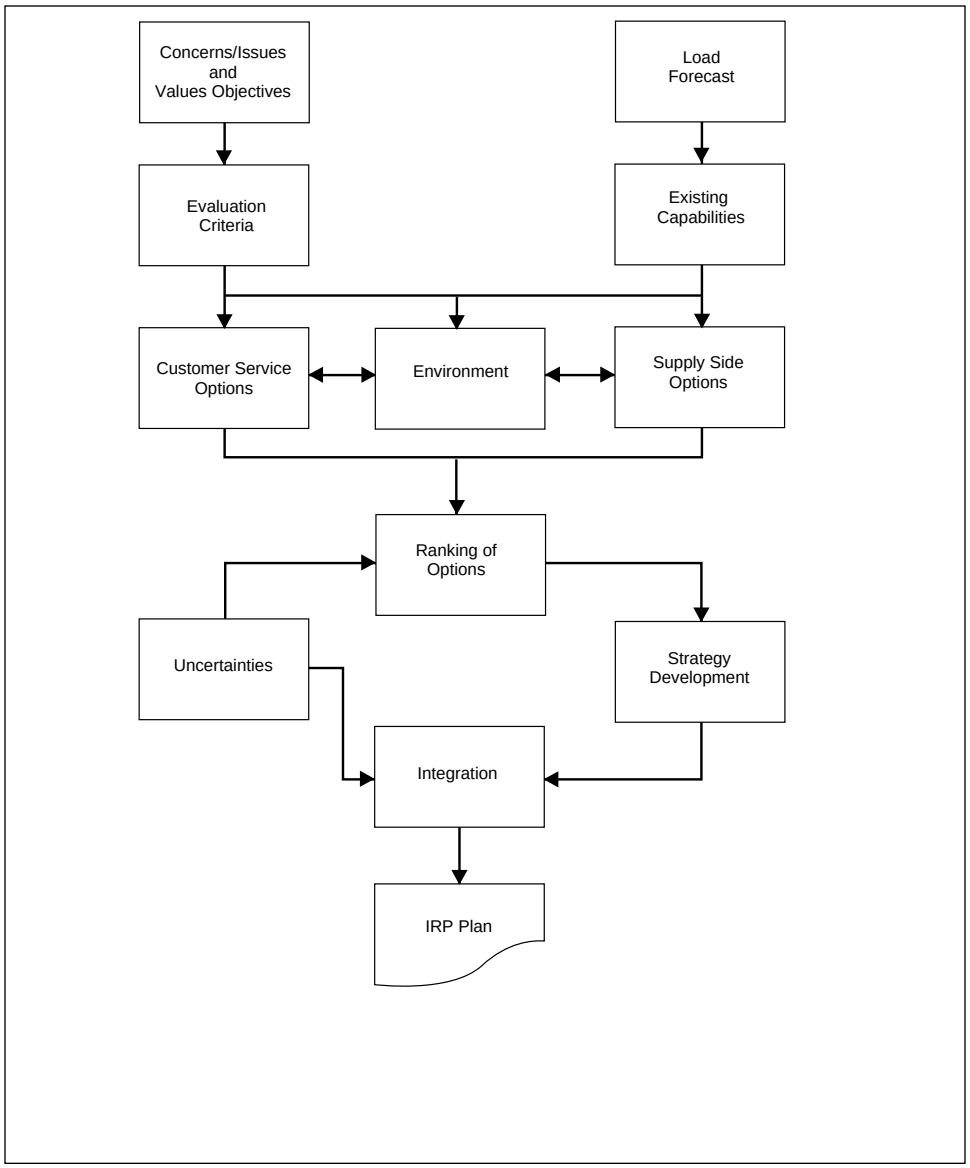
The Technical Process Will Use Teams

As illustrated in figure I.1, TVA divided the technical process into 11 major steps or "building blocks." For each building block, TVA formed an interdisciplinary study team. TVA gave each team specific objectives and

[2]Supply-side resources, according to TVA, are resources that meet customer needs by increased production of electricity. TVA defines demand-side management as programs that promote activities which influence the customer's electricity use.

required the teams to develop and analyze data for the IRP process. The progress of the teams is reviewed as they present their work to the TVA Forecast Review Board (consisting of the managers of the major departments in TVA) and the Board of Directors. The teams have also presented their work to the IRP Review Group (a panel of about 20 members who represent TVA distributors, large industrial customers, environmental and public advocacy groups, and academicians). TVA created the IRP Review Group to provide input and advice on IRP data and to propose additional issues or options for further consideration in the IRP process.

Figure I.1: TVA's IRP Process Building Blocks



Source: TVA.

Issues and Values Translation Team

Early in the IRP process, the Issues and Values Translation team met with representatives of industrial customers, distributor customers, and environmental groups to obtain initial comments, issues, and concerns relating to TVA and TVA's IRP process. In addition, the team reviewed over 20 different IRP reports from other utilities to ensure that TVA did not omit any important issues in its IRP process. The team compiled a list of the initial

issues and concerns from these various sources and categorized them according to evaluation criteria, objectives, constraints (absolute limits on criteria), options, and uncertainties (factors beyond TVA's control). The team then distributed these issues and concerns to the appropriate building-block teams, which were required to address the issues and concerns while developing the data for their building-block teams. For example, the list of issues and concerns that relate to options were disseminated to the Customer Service Options team and Supply-Side Options team. Throughout the IRP process, TVA gathers issues and concerns raised by the public and by TVA employees. The building-block teams are to address these issues and concerns.

Evaluation Criteria Team

The Evaluation Criteria team developed criteria for assessing the individual options considered in the IRP process. The team sorted the evaluation criteria into eight categories. TVA is using each category to evaluate the options and strategies (combinations of options) being considered in the IRP. The eight categories are: (1) long-run cost/value, (2) electricity rates and competitiveness, (3) reliability, (4) environment, (5) economic development, (6) financial, (7) risk management, and (8) equity.[3] The team then selected the measurement methodology for each criterion. For example, TVA utilizes the Participant Test, Rate Impact Measure Test, Total Resource Cost Test, and Total Value Test in its analysis of the long-run cost and value of TVA's customer service options.[4]

Load Forecasting Team

TVA's IRP Load Forecasting team predicted TVA's future demand for power for the next 25 years. Predicting future demand is essential to long-term resource planning, because if TVA underforecasts its power demand, it may not possess sufficient resources to meet its power needs. On the other hand, if TVA develops resources too far in advance of actual demand, customers may face the risk of higher rates to pay for unproductive power plants.

The team generated a long-term forecast for the growth in electricity demand by predicting (1) TVA's system energy requirements (the amount of total energy in kilowatt hours that TVA must produce each year to satisfy

[3]The environmental evaluation criteria was actually developed by TVA's Environment team.

[4]According to TVA, the Participant Test measures the quantifiable benefits and costs of an option from the point of view of the participating customer. The Rate Impact Measure Test measures the difference between the change in total revenues paid to a utility and the change in total costs to a utility resulting from the option. The Total Resource Costs Test measures the total net resource expenditures of an option from the point of view of the utility and ratepayers as a whole. The Total Value Test measures not only the total cost of an option, but also the benefits or "value" that participants and ratepayers receive.

its customers' needs) and (2) TVA's peak demand (the maximum amount of power drawn from TVA's power system over a given period of time). The team produced the TVA load forecast for the next 25 years using econometric and end-use load forecasting models, most of which were developed by the Electric Power Research Institute.

Existing Capabilities Team

Before TVA can decide how it will meet the forecast demand, it must first assess the capabilities of its existing generating system. The Existing Capabilities team determined that in fiscal year 1994, TVA had approximately 25,600 megawatts (MW) of dependable generating capacity[5]. Because of the possibility of power outages caused by equipment failures or other unforeseen events, TVA assumes that its power system is not 100 percent reliable. To estimate the future availability of its power system, the Existing Capabilities team made certain assumptions about the future reliability of TVA's existing power generating facilities. For example, the team assumed that all of TVA's nuclear power units will operate at an equivalent availability of 67 percent.[6] The team also assumed that TVA's coal units will operate at an equivalent availability of 85 percent, its hydroelectric power plants will operate at an equivalent availability of 93 percent, and its combustion turbines and pumped storage facility will operate at equivalent availabilities of 95 percent and 89 percent, respectively.

Because its power system is not 100 percent reliable, TVA plans for additional capacity to provide a reserve margin sufficient to maintain the reliability of the power system. TVA estimates its reserve margins based on an evaluation of the costs of maintaining a reliable power system, the past and projected performance of the TVA system, and a comparison of the performance of TVA's system with the performance of other power systems. Using these data, the team estimated that TVA must maintain an average annual capacity reserve margin of 15 percent for the years 1995 through 1997 and 12.5 percent for 1998 through 2020.

TVA also has industrial interruptible-power contracts, which allow it to interrupt power to industrial customers during peak demand periods. The team assumed that the amount of industrial load available for interruption

[5]TVA defines dependable capacity as the amount of electric power that TVA can deliver from a generating unit, as determined by the manufacturer's nameplate ratings or by testing. For example, the dependable capacity of a combustion turbine power plant, based on its nameplate rating, would be stated as 225 MW.

[6]TVA defines the equivalent availability of a generating unit as the maximum achievable capacity of the unit, expressed as a percentage, after the consideration of forced outages, planned outages, and deratings of the unit.

during peak periods will decrease from 1,765 MW to 1,023 MW between 2000 and 2020, due to the termination of several interruptible-power contracts.

Based on these assumptions and TVA's fiscal year 1994 load forecast, the team estimated that by fiscal year 1998, TVA will need approximately 700 MW of additional capacity and several thousand more MW by fiscal year 2005.

Supply-Side Options Team

TVA defines supply-side options as actions that TVA can undertake to increase the amount and reliability of the power available for its customers. The Supply-Side Options team compiled a list of supply-side options that included nuclear, coal, and natural gas units, as well as power generated by independent power producers and cogeneration facilities. The team concentrated on identifying new options that had a reasonable likelihood of commercialization within the next 10 years. Many of the options were developed from TVA's internal research, data available at the Electric Power Research Institute, and data provided by outside consultants and contractors.

The team compiled several pieces of data for each supply-side option, including the type of energy the option would provide (baseload, intermediate, or peak), operation and maintenance costs, availability dates, capacity figures, fuel requirements, emission rates, and decommissioning costs. Examples of supply-side options under consideration include the cancellation, conversion, deferment, or completion of nuclear plants; improvements to existing hydroelectric plants; and the construction of new coal plants and combustion turbines. The team also included options for renewable energy sources, such as wind power or solar power.

The team is also evaluating proposals that give TVA the option to purchase power from other utilities. In July 1994, TVA formally solicited bids for option purchase agreements up to 2,000 MW of peaking capacity in the 1997 to 2006 time period and beyond, and up to 2,000 MW of baseload capacity in the 2000 to 2006 time period and beyond. By December 1994, TVA had received 138 different proposals from 38 power producers. The team will evaluate the proposals and incorporate the most promising proposals in the IRP process. The Integration team is evaluating each available supply-side and other option to determine the ones or combinations that may best meet TVA's future power needs.

Customer Service Options Team

TVA's Customer Service Options team has a primary goal of identifying feasible customer service options—actions that TVA can take to influence the nature of its customers' electric power demands. For example, load management programs, such as a program that would provide commercial customers with bill credits to curtail load when notified by TVA, are customer service options designed to shift the time of energy consumption from peak to off-peak hours. Utilizing input from TVA customers, reviews of other utilities' IRP reports, and assistance from outside consultants, the Customer Service Options team developed customer service options for consideration in the IRP process. Options under consideration by the team include demand-side management programs, load management programs, self generation by commercial and industrial customers, two types of rate options, and beneficial electrification options.[7]

In developing these options, the team identified a list of customer service technologies, such as high efficiency heat pumps and compact fluorescent lamps, that exist in today's market or are emerging technologies in the utility industry. For each technology, the team gathered data, including the costs to install the technology, the costs to maintain the technology, the overall costs to the distributor or industry, and the effects on energy consumption and peak demand.

As the team created this list of technologies, it qualitatively screened them to eliminate unfeasible ones. For example, a technology may be screened out because it was not a good application for the Tennessee Valley's climate. Also, an emerging technology may not be considered if adequate data to assess its costs and impacts were unavailable or could not be adequately estimated. During any point in the IRP process, TVA may reconsider the technologies eliminated from consideration during the preliminary screening.

The team ranked the load management and demand-side management technologies by using the Total Resource Cost Test as a quantitative test to determine the benefit/cost ratios for the technologies. The beneficial electrification technologies were ranked using the Rate Impact Measure Test to determine their effects on rates. The team also evaluated the technologies using the Participant Test and the Total Value Test.

[7]Beneficial electrification options tend to increase sales of, and demand for, electricity by promoting the new use of electricity or the substitution of electricity for other fuels. These effects should provide customer value, such as increased convenience, or environmental benefits. For example, the electronic sterilization of medical instruments is in TVA's IRP process.

The team then designed programs, such as financing plans and direct appliance installation plans, that would incorporate the technologies to achieve desired levels of voluntary customer participation, meet TVA's financial and economic goals, and provide options for all customer classes. In constructing the programs, the team examined TVA's past and present customer service options, and the IRP reports and the customer service programs of other utilities. The team also studied 80 effective demand-side management programs compiled by the IRT Results Center, an organization that reviews hundreds of demand-side management programs and reports examples of the best programs in the industry. The team evaluated the program designs they developed using the Total Resource Cost Test, Rate Impact Measure Test, and the Participant Cost Test.

The team then integrated the program designs and the technologies to create customer service options. The team based the integration on the characteristics of (1) the technologies under consideration, (2) the customers that would benefit from the options, and (3) the methods of delivering the energy services to the customer. Finally, the team evaluated the options, using the various cost and impact tests, to determine their estimated impact on TVA, its customers, and the region as a whole.

Environment Team

The Environment team developed criteria to evaluate the environmental impacts of the various options and combinations of options that are under consideration in the IRP process.[8] The team linked the various environmental issues and concerns that were identified by the public with measurable scientific or environmental pollutants or activities. The team then developed 15 different criteria to address these issues and concerns. The team also determined the measurements for each of the criteria. For example, the team is evaluating the effects of potential resource options on human health and fish and aquatic life by determining the level of various emissions released by the options. These emissions and other criteria measurements will be weighted by the Environment team to estimate each strategy's effects on the environmental criteria. The team also used the list of environmental concerns to develop environmental uncertainties, or future events that are beyond TVA's control. The team is

[8]In conjunction with the IRP, TVA plans to issue an Environmental Impact Statement, as required by the National Environmental Policy Act of 1969, that will describe the environmental effects that are regional, national, or global in scale, or which are generic, for a range of strategies under consideration in the IRP process. Strategies selected by TVA may result in site-specific resource projects in future years. For such projects, the Environmental Protection Agency suggested that TVA conduct detailed, site-specific Environmental Impact Statements in the future that will address the potential environmental impacts of the projects for the particular location or area at which the option will be implemented.

conducting probability analyses of possible future regulations concerning environmental issues and determining the effects on TVA's operations. The team also assisted in the development of environmental strategies (combinations of resource options) that will specifically address existing or pending environmental legislation, such as the Clean Air Act Amendments of 1990.

Rankings Team

The Rankings team ranks the supply-side and customer service options using TVA's IRP evaluation criteria. The team uses a computer simulation model to create the rankings of the options. Typical option rankings could be based on lowest total resource cost, least amount of emissions released, highest power output, lowest impact on rates, or any combination of these factors. The Strategic Development team used the results of the rankings in developing strategies.

Strategy Development Team

The Strategy Development team constructed unique strategies by combining various options developed by the Customer Service Options and Supply-Side Options teams. Each strategy consists of options that are categorized as supply-side, customer service, pricing/rates, environment, and/or transmission options. By using the data provided by the Rankings team, the Strategy Development team created several strategies to address specific criteria, such as total cost, emissions rates, and electricity rates; and to address specific uncertainties, such as future load growth, natural gas prices, and carbon dioxide regulations. For example, if the team wanted to create a strategy that minimized costs, it would select the lowest cost options determined by the ranking process for each of the above strategy categories. The Strategy Development team forwarded these strategies to the Integration team, which is evaluating the strategies using TVA's evaluation criteria and the uncertainties developed by the Uncertainties team.

Uncertainties Team

The Uncertainties team evaluated a list of issues and concerns that refer to uncertain events in TVA's future that are beyond TVA's control. These items were referred by the public and other building-block teams. The Uncertainties team quantified each uncertainty in order to evaluate impacts on resource decisions. The team also developed a range of low, medium, and high levels for these uncertainties. The team conducted sensitivity analyses to determine the effect of changes to the uncertainty level on TVA's evaluation criteria. For example, given the existing TVA generating system, an increase in load growth could cause TVA's electricity rates to increase. On the other hand, increases in nuclear fuel costs have a minimal effect on TVA's electricity rates. As a result of these analyses, the

team identified load growth, nuclear issues (capacity factor, operation and maintenance cost, and capital cost), environmental issues (carbon dioxide compliance and air/water environmental controls), natural gas prices, co-product prices, and demand-side management effectiveness as the most sensitive uncertainties in its IRP process.[9] The Uncertainties team provided these uncertainties to the Integration team for the formation of "futures" (combinations of two or more uncertainties), and for analyses to determine the effects that changes to uncertainties have on the strategies developed by the Strategy Development team.

Integration Team

The Integration team analyzes the effects of the strategies on evaluation criteria and determines the "flexibility" and "robustness" of these strategies when the uncertainties of the future fluctuate. TVA defines a "flexible" strategy as a strategy that can be changed in the future to adapt to changing conditions. A "robust" strategy, according to TVA, is a strategy that, once implemented, should withstand shifts in long-term conditions in the utility industry. For example, a flexible strategy may include the deferment of Watts Bar 2 and Browns Ferry 1. This would give TVA the flexibility to complete the plants in the future if TVA's load growth were higher than expected, but it would also allow TVA the option of canceling the plants in the future if TVA's predicted future load growth does not warrant the completion of the plants. A "robust" strategy would have effects on TVA's evaluation criteria (for example, costs, electricity rates, and emissions rates) that do not vary significantly with future changes in the uncertainties (for example, changes in load growth, natural gas prices, and nuclear unit capacity factors).

To generate this analysis, the team utilizes computer-based simulation models and analytic software to simulate the power system and analyze multi-attribute trade-offs. These tools help TVA to determine the strategies that best satisfy the IRP evaluation criteria and provide TVA with flexible and robust strategies for the future. These models allow TVA to analyze and compare strategies associated with particular futures[10] and determine the effects on different evaluation criteria. As a result of these analyses, "trade-offs" may occur. For example, one strategy may have lower costs and emissions, but higher short-term rates. In this case, the Integration team would attempt to improve the strategy by removing options that cause the higher short-term rates. The team would replace them with

[9]Even though the team determined the environmental uncertainties and the demand-side management program effectiveness uncertainties to be marginally sensitive in most cases, TVA included them in the integration process because of the interest of the Review Group members in these two areas.

[10]TVA refers to a strategy associated with a future as a "scenario."

options that have lower short-term rates and that would not significantly change the strategy's effects on costs and emissions.

The team plans to complete these analyses in three phases. At the end of January 1995, the team had completed the first phase of the integration process by analyzing the 35 strategies developed by the Strategy Development team. Some of TVA's key observations resulting from this phase include: (1) supply-side and demand-side options that have low costs also have low electricity rates in the short run and low debt; (2) several options reduce environmental emissions but increase long-term costs or electricity rates; (3) increased amounts of demand-side management produce low costs and debt but increase electricity rates in the short run; (4) the deferral of nuclear units and formation of a partnership at Bellefonte have lower costs, lower electricity rates in the short run, and reduced emissions; (5) several strategies that lower costs and emissions have higher electricity rates in the short run; and (6) the deferral of nuclear units can provide flexibility in adjusting to uncertain nuclear performance.

By the end of February 1995, the Integration team had compiled the results of the second phase of the integration process. The team eliminated many of the simpler strategies, referred to as customer service and supply-side strategies, because the team wanted to identify options to be included in more complex strategies. The team also developed new strategies and revised several existing strategies to reflect new data for certain options. The Integration team finished the second phase of the integration process with 22 different strategies, each of which had been developed to address certain criteria and/or uncertainties.

During the third phase of the integration process, which TVA completed at the end of March 1995, the integration team continued to analyze and revise its list of strategies. The team reduced the number of strategies under consideration in the IRP by combining the best options from existing strategies and by modifying existing strategies to improve their effects on TVA's evaluation criteria given different futures. These remaining strategies will be incorporated into the IRP report submitted to TVA's Board of Directors.

Public Participation Process

Pursuant to the public participation requirements of the Energy Policy Act of 1992 and the National Environmental Policy Act of 1969, TVA's Public Participation team developed a plan to involve the public in TVA's IRP

process. The team, with the help of consultants and reviews of the public participation processes used by other utilities, developed a four-part public participation process.

First, the team met with TVA's distributors, industrial customers, environmental groups, and others, to identify initial issues, concerns, and comments about TVA and the IRP process. TVA has also collected written comments from the public during the IRP process. Many of the concerns, such as concerns about TVA's debt, the future impact of TVA's rates, and the environmental impact of various generating options, have been incorporated into the IRP process as evaluation criteria. For example, TVA consulted with Tennessee Valley Public Power Association (TVPPA) on the various customer service options in the IRP. TVA held two meetings with the TVPPA Energy Services Committee, which consists of representatives from TVA's distributor customers, to discuss the feasibility and cost of various customer service options that are under consideration in the IRP process.

Second, TVA interviewed approximately 100 opinion leaders in the TVA service area to gather opinions on issues TVA is evaluating in its IRP process. A consulting firm analyzed the results of the surveys, and TVA is considering the opinion leaders' comments and concerns in the IRP process.

Third, TVA held a series of open public meetings throughout the Tennessee Valley. The meetings consisted of interactive computer displays presenting information on TVA's operations and the IRP process. TVA staff were available to answer questions from the public about TVA and/or the IRP. In response to complaints from the public that concerns were not being heard, TVA added an hour-long discussion period in subsequent meetings to provide the public an opportunity to voice their concerns to TVA. After the release of the IRP draft report, TVA intends to hold another series of public meetings to obtain the public's comments on the report.

Finally, TVA created the IRP Review Group, which meets monthly with TVA to hear presentations by the different building-block teams and to provide input concerning TVA's IRP assumptions and options for consideration in the IRP. TVA also expects the Review Group to provide their perspectives on issues facing TVA and to review TVA's analyses and IRP results.

Reviews of TVA's IRP Process

In addition to the multitude of consultants that TVA has utilized in developing and conducting its IRP process, several additional consulting

firms are reviewing TVA's IRP process. For example, in April 1994, TVA hired the Tellus Institute of Boston, Massachusetts—a consulting firm with expertise in the electricity generation market—to review and assist with TVA's IRP process. According to TVA officials, Tellus provides an independent review for the TVA Board of Directors of the IRP's criteria, assumptions, analyses, and building-block team presentations. Tellus also advises TVA on improving the IRP methodology and data.

TVPPA selected a consulting firm in September 1994 to assist it in analyzing certain aspects of TVA's operations, including TVA's nuclear power plants and other power supply options, TVA's debt, TVA's load forecasting, and the reliability of TVA's service. The study will assist the distributors to plan the least-cost future power supply that satisfies accepted standards of reliability, safety, and environmental sensitivity. The consultant's findings will be presented to TVPPA's members and to TVA prior to the issuance of the final IRP report. Also, TVA has hired several consulting firms on behalf of the IRP Review Group to review certain aspects of the IRP. For example, TVA has entered into contracts with consulting firms to review TVA's load forecast, nuclear power assumptions, and the integration analyses of the IRP. In addition, individual IRP Review Group members have hired consultants to review certain IRP data presented to the IRP Review Group.

Status of the IRP Process

TVA distributed a preliminary draft of its Integrated Resource Plan to the IRP review group on May 31, 1995. The draft report included a 25-year long-term action plan and a 3-year to 5-year short-term action plan. The short-term plan identified possible actions or tasks that TVA could undertake initially in order to achieve the objectives of its long-term plan. The long-term plan consists of a range or "portfolio" of preferred resource options identified through analyses of strategies during the integration process.

TVA released its draft plan to the public at the end of July 1995. TVA will schedule meetings to obtain comments from the general public on its draft and publish its final IRP report in December 1995. Finally, the IRP resource decisions that will determine TVA's overall energy strategy for the next 25 years will be made by TVA's Board of Directors in January 1996.

Review of TVA's Load Forecasting

The purpose of this appendix is to review TVA's load forecasting methodology, the economic inputs and assumptions that TVA used to calculate these forecasts, and the accuracy of the results. We found that TVA's current load forecasting methodology is generally reasonable and state of the art when compared to other forecasting tools available in the electric utility industry. In addition, TVA's current methodology is substantially more sophisticated than forecasting techniques TVA used in the 1970s and early 1980s. As a result, the accuracy of TVA's load forecasts has improved. However, because the past forecast accuracy cannot be extrapolated to the future, we reviewed the general reasonableness of TVA's current long-range 1995 load forecast by comparing it with forecasts made by some neighboring utilities. We found that in comparison to the neighboring utilities, TVA's current load growth forecast is at the high end of the range.

TVA's Forecasting Methodology Is Generally Reasonable

In comparison with what is generally available in the utility industry as well as what is actually used by other utilities we contacted, TVA's forecasting methodology is generally reasonable.[1] The strength of TVA's methodology lies in its use of an extensive forecasting system, including (1) state-of-the-art forecasting models, (2) region-specific data, and (3) a probability analysis assessing the uncertainty associated with key variables in the load forecast.

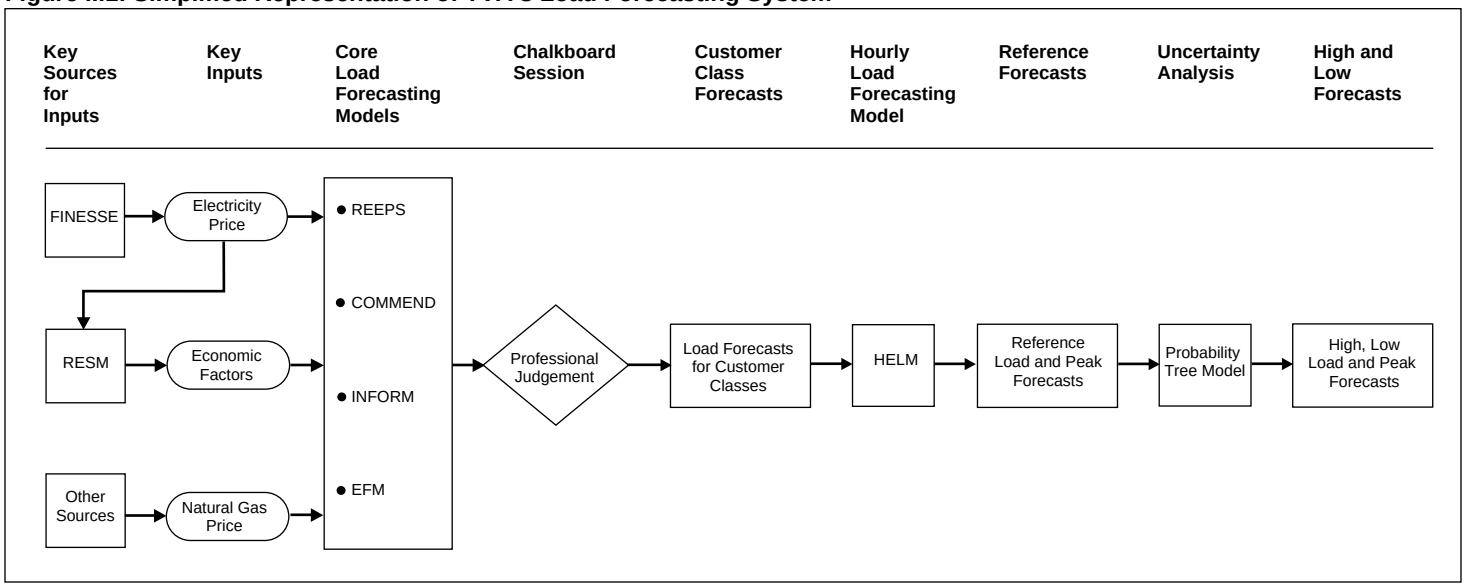
TVA Uses Several Different Models to Forecast Load

Three "end-use" and one "econometric" forecasting models form the core of TVA's forecasting methodology.[2] TVA uses the output from these models to calculate its long-term forecast for electricity load demand by three customer classes—residential, commercial, and industrial. Figure II.1 is a simplified representation of TVA's load forecasting system.

[1]This discussion refers to TVA's long-term forecasting methodology. TVA also develops a short-term (1 year to 3 years) load forecast, which is based on a less extensive modeling system.

[2]In an end-use model, demand is derived from specific end uses of electricity (for example, cooking) and the factors that influence such uses. The econometric approach uses past statistical relationships between electricity sales and key variables (for example, economic activity and price) to forecast future sales.

Figure II.1: Simplified Representation of TVA's Load Forecasting System



Source: GAO analysis of TVA data.

Each of the three end-use models is designed to forecast demand for a specific customer type and end use. For example, TVA uses the Residential End-Use Energy Planning System (REEPS) model to forecast load in the residential sector. The model forecasts household demand as a function of electricity required for specific residential uses like space heating and cooking. In turn, residential demand for electricity in the region is greatly affected by growth in such economic factors as per capita income and population. In addition, because the model allows consumers to choose between electric and gas appliances, the prices of electricity and natural gas are important inputs.

Similarly, the Commercial End-Use Energy Planning System (COMMEND) model is used to forecast electricity load in the commercial sector. In COMMEND, the load for various building types such as offices, restaurants, and retail stores, is derived from energy use in specific end-uses, such as lighting, computers, and air conditioning. The key determinant of electricity demand in this customer class is the amount of commercial floor space, which, in turn, is related to such economic factors as the growth in economic activity and employment, the price of electricity, and the intensity of electricity use within each building type. For example, an

increase in economic activity leads to an increase in the demand for office space (for example, square footage) as well as increase in the need for lighting and heating/cooling.

Finally, the Industrial Energy End-Use Model (INFORM) model is used to forecast load for TVA's industrial customers that are served through its distributors. However, TVA has had limited success with the INFORM model to date and has, instead, used its econometric model to forecast the load for these customers. In addition, TVA forecasts separately the load it expects to sell directly to several industrial customers. This load forecast is developed using primarily professional judgment and contractual agreements with individual customers.

A fourth model that forms the core of TVA's forecasting system is the Electricity Forecasting Model (EFM). TVA also uses this model to forecast demand by residential, commercial, and industrial customers. However, EFM forecasts are based on more aggregate data, including such factors as the regional price of electricity and income and employment, rather than specific end-uses.[3]

As shown in figure II.1, TVA relies on several other models to derive its load forecasts. For example, the Regional Economic Simulation Model (RESM) is used to forecast key regional economic factors for the TVA region, and a financial model (FINESSE) is used to develop electricity prices which are key inputs to the load forecasting system.

To develop the final load forecast for each customer class, TVA's analysts use the forecasts produced by the end-use models and the econometric models as well as professional expertise. In other words, during a "chalkboard session," the analysts compare and contrast the models' forecasts with their own professional judgment, the prior year's forecast, and basic trends in electricity demand in order to derive a forecast for each customer class. For example, the analysts might compare the REEPS and the EFM residential forecasts with last year's forecast and an extrapolation of recent consumption patterns to select the most plausible forecast for this customer class.

[3]According to TVA analysts, the combination of the end-use and econometric forecasting models allows the analysts to take advantage of the strengths of both approaches. For example, one of the benefits of using the end-use models is that TVA can assess the potential effect of future energy efficiency standards on electricity demand. Conversely, because the econometric approach relies primarily on historical relationships among key variables to project load, the use of EFM's forecasts ensures that the load forecast incorporates past customer behavior. However, neither approach can accurately predict all future changes, such as changes in consumer taste and technology.

Finally, using the load forecasts calculated from the core forecasting models as an input into the Hourly Energy Load Model (HELM), TVA's analysts develop the reference load forecast for the entire TVA system. HELM is also used to derive TVA's peak demand forecast.

TVA Uses Region-Specific Data in Developing Its Forecasts

We found that TVA has made a reasonable attempt to use region-specific data to modify its models to reflect the characteristics of TVA's power service area. Because some of TVA's forecasting models were designed and built by industry consultants for use by utilities nationwide, their structure and data may reflect a national average and, as a result, can be modified to reflect the characteristics of the region in which they are used. For example, TVA has developed region-specific data to modify REEPS for such things as the type of appliances used by the residential customers in its power service area. However, neither TVA nor any other utility we contacted has developed a complete region-specific data system.

However, among the utilities that we contacted, TVA more than other utilities has developed its own regional modeling capability in order to forecast economic factors for the TVA region. For example, key regional economic variables, such as economic growth and employment, which are used in TVA's modeling system are developed by TVA's analysts using this regional economic forecasting model.

TVA Uses Probability Analysis to Address Uncertainty in Key Variables

After the reference forecast is derived, TVA analysts use probability analysis to address the uncertainty associated with a few key variables used in its models and to develop a range of alternative forecasts. Although TVA's uncertainty analysis is limited to a few key variables, we found that TVA's probability analysis is generally more extensive than that used by other utilities we contacted.

Using this uncertainty analysis, TVA's analysts can assess the impact of a range of values for the key variables on the reference forecast. For example, using a high and low value for regional economic growth and the probability associated with each growth assumption, high and low alternative load forecasts and their probabilities are calculated. These high and low forecast alternatives include cumulative effects of the variation of all key variables. At this point, all alternative forecasts are ranked from high to low, and two forecasts are selected from this range. The analysts select the two forecasts that reflect an acceptable high and low probability. For example, TVA's current low forecast reflects a load demand

with a cumulative probability of 10 percent; that is, TVA's analysts believe there is only a 10-percent chance that the actual load will be lower than this low forecast. Similarly, the high growth demand has a 90-percent cumulative probability, which means that TVA's analysts believe there is only a 10-percent chance that the actual load will be higher than this high forecast.

Accuracy of TVA's Current Long-term Forecast Is Uncertain

Primarily as a result of an improvement in its load forecasting methodology, the accuracy of TVA's medium-term load forecasts has improved over time. However, we could not independently verify the accuracy of TVA's long-term forecasts. Because of changes in TVA's methodology, the record of TVA's past forecast performance cannot be used to assess the ability of TVA's current methodology to forecast accurately. In addition, such an assessment would require the future values for forecast variables. On the other hand, the general reasonableness of the current load forecast can be determined by comparing it with forecasts made by other neighboring utilities. We found that TVA's 1995 reference load forecast is at the high end of a range of forecasts made by these other utilities.

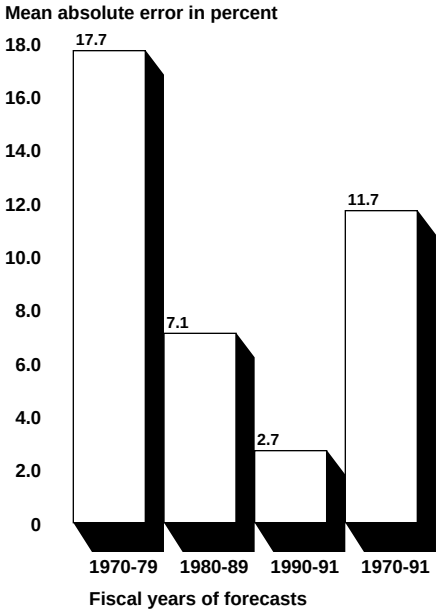
Improvement in Methodology Has Led to Increased Accuracy

TVA's load forecasting methodology progressed from a simple trend approach in the mid-1970s to the more sophisticated methods used today. As a result, the accuracy of TVA's medium-term (4 years to 5 years) forecasts made in the 1980s and the early 1990s improved substantially. As shown in figure II.2, the mean absolute error[4] of TVA's medium-term load forecasts declined from 17.7 percent in the 1970s to 2.7 percent in the early 1990s.[5]

[4]Mean absolute error is the mean difference, regardless of sign, between the actual value and the forecast value, calculated using each year of the forecast.

[5]Although there is no agreement among experts about the acceptable level of accuracy, some utility forecasters believed that a 5 percent, plus or minus, medium term accuracy is reasonable.

Figure II.2: Accuracy of TVA's Medium-term Historic Load Forecasts



Note: Mean absolute error is calculated using the average of the 4-year and 5-year forecasts for each vintage between 1970 and 1990, and the 4-year forecast for vintage 1991. Vintage is the fiscal year for which the forecast is prepared.

Source: GAO analysis of TVA's load forecasts.

Trend analyses, or extrapolations of past consumption patterns, were used by TVA and other electric utilities in the 1970s to forecast load demand. Because the early 1970s was a period of growth in demand for energy, forecasts made using this approach in the mid-1970s projected increasing load demand throughout the 1980s. Partly as a result of these forecasts, TVA began an ambitious program to build additional nuclear generating capacity. However, electricity consumption declined in the mid-1970s following the 1973 energy crisis and declined again in the late 1970s and early 1980s as a result of high energy prices and lower economic growth.

To improve its forecasts, TVA analysts turned to more sophisticated modeling techniques, which enabled them to relate the load forecast directly to the key variables that affect electricity demand, such as growth in regional economic activity. As a result of these improvements, TVA's load

forecasts in the early 1980s were revised downward. Based partly on these revised lower forecasts, TVA cancelled construction on eight nuclear units.

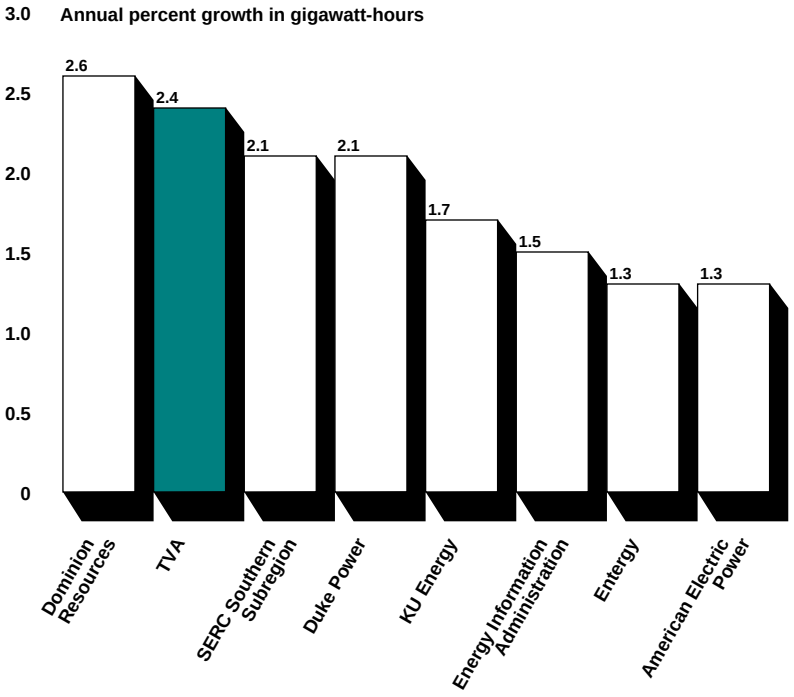
An additional factor, according to TVA analysts, that contributed to an improvement in the accuracy of TVA's load forecasts was an increase in the diversity of its customer base. TVA's customer base diversified in the 1980s as more energy-intensive firms, such as several primary producers of aluminum, ferro-alloys, and chemicals, terminated or scaled back production. Load demand based on a more diversified customer base will be less susceptible to fluctuations in demand for electricity by any one customer. Similarly, load forecasts made by TVA in the late 1970s included load required by the Department of Energy's (DOE) uranium enrichment facility. Because DOE cancelled this contract, TVA's earlier forecasts overstated actual load demand.

TVA's 1995 Reference Load Forecast Is at High End of Range for Neighboring Utilities

We found that TVA's fiscal year 1995 reference load forecast is at the high end of the range of available load forecasts made by TVA's neighboring utilities and DOE's Energy Information Administration.[6] However, we could not independently assess the accuracy of TVA's 1995 forecast. As shown in figure II.3, TVA's 1995 forecast projects a 2.4 percent annual increase (compound growth) in demand for gigawatt-hours between 1994 and 2003.

[6]Because the load forecasts are based on different geographic areas as well as different types of electricity consumers, they are not entirely comparable. We make the comparison to illustrate generally how different utilities and the Energy Information Administration view future load demand in the southern region of the United States. We based this comparison on the reference forecast because this forecast has the highest probability. However, TVA's low forecast alternative, which has a lower probability, projects lower load growth for the same time period.

Figure II.3: Growth in Electricity Load Forecast by TVA, Neighboring Utilities, and the Energy Information Administration for 1994-2003



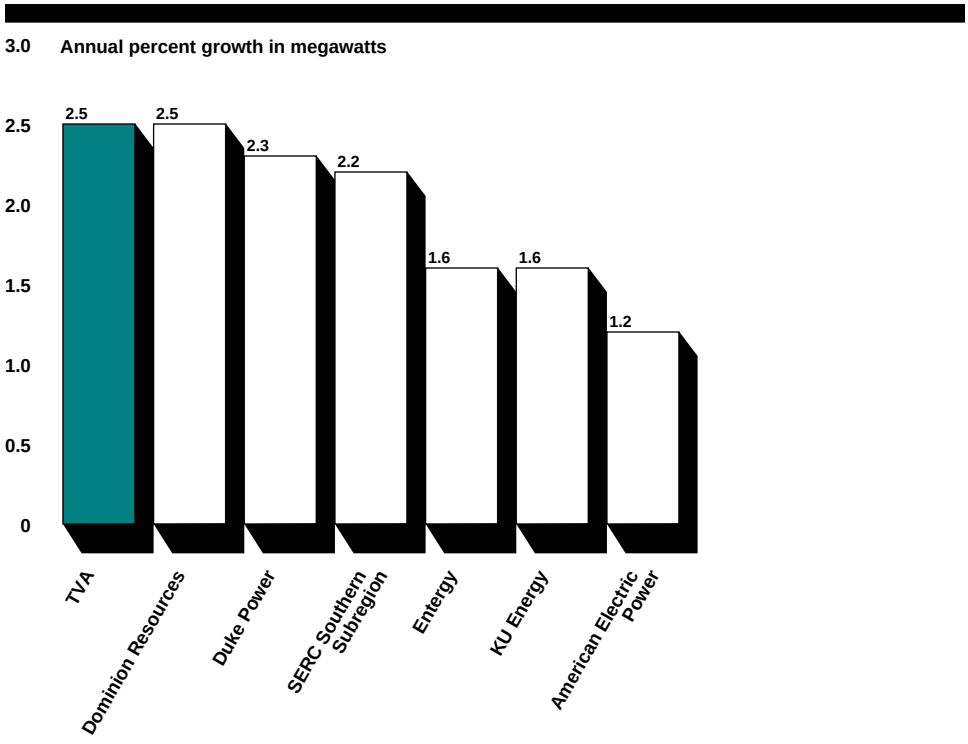
Notes: The Southeastern Electricity Reliability Council's (SERC) Southern Subregion forecast includes forecasts made by several utilities, including those represented by the Southern Company. Energy Information Administration's forecast is for the SERC region, excluding Florida.

Load forecasts are based on the economic and energy-use characteristics of a utility's service territory and may not be fully comparable. We used 1994 as the base year for this analysis.

Source: GAO analysis of data from TVA, neighboring utilities, and DOE.

Figure II.4 compares TVA's peak forecasts in MW with the forecasts of other utilities.

Figure II.4: Growth in Electricity Peak Demand Forecast by TVA and Neighboring Utilities for 1994-2003



Notes: The Southeastern Electricity Reliability Council's (SERC) Southern Subregion forecast includes forecasts made by several utilities, including those represented by the Southern Company.

Load forecasts are based on the economic and energy-use characteristics of a utility's service territory and may not be fully comparable. We used 1994 as the base year for this analysis.

Source: GAO analysis of TVA's and neighboring utilities' data.

We used this comparison to assess the general reasonableness of TVA's current load forecast because TVA's record of past performance cannot be used to assess the accuracy of the current load forecast. That is, due to changes in TVA's methodology over the last 20 years, TVA's historic forecasts cannot be used to develop appropriate measures of long-term (10 to 20 years) accuracy.

TVA's Key Regional Economic Growth Assumption Is More Optimistic Than Data Resources, Inc.'s

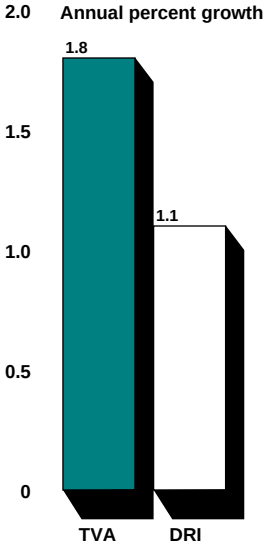
TVA's reference forecast is driven partly by TVA's forecast of economic activity. We found that TVA's assumption about future economic activity is at the high range when compared to other available forecasts for the region. Based on RESM, its own economic forecasting model, TVA estimates that its service area will grow at a 3.9 percent annual rate between 1993-2000, and a 2.4 percent annual rate between 2000-2020.[7] TVA's projection of 3.9 percent annual growth over the 1993-2000 period is based primarily on an expectation that durable industries such as transportation will expand at a greater rate in its service area than in the U.S. as a whole.

In comparison, growth projections made by Data Resources, Inc., (DRI) for the East South Central Region of the United States, including Kentucky, Alabama, Mississippi, and Tennessee, are less optimistic.[8] As shown in figure II.5, DRI projects a growth rate of 1.1 percent in total employment over 1994-2004 versus TVA's 1.8 percent projection over the same period.

[7]Growth rates are for gross regional product for the power service area.

[8]We used DRI's employment projections for East South Central because comparable gross regional product data were not available from DRI and these four states comprise an important portion of TVA's power service area.

Figure II.5: Growth in Total Employment Forecast by TVA and Data Resources, Inc., for 1994-2004

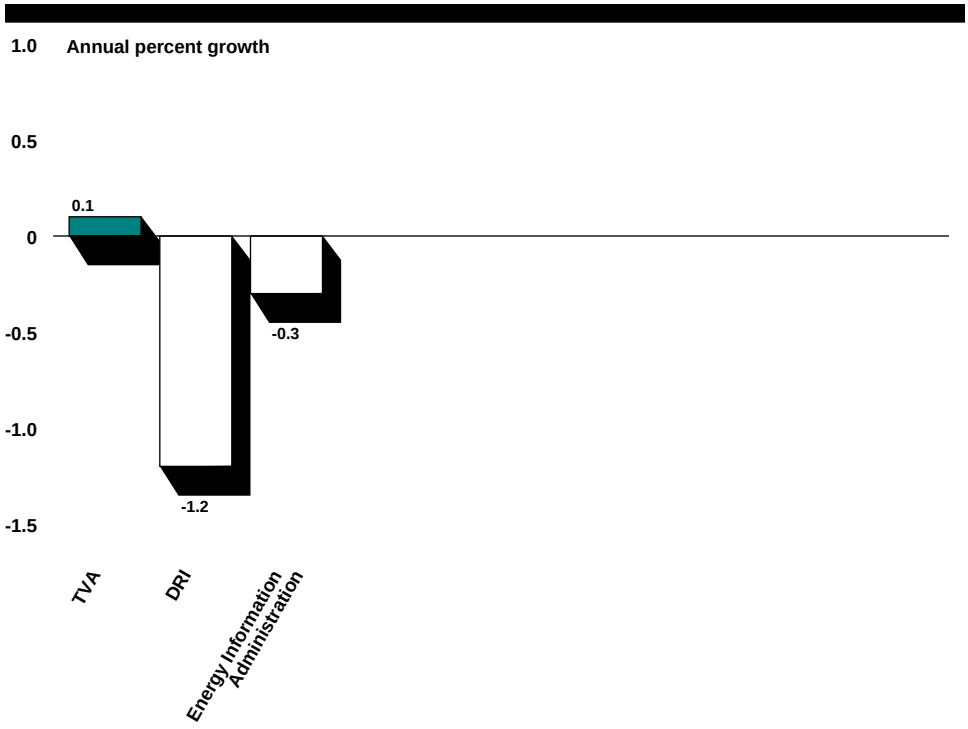


Note: TVA's employment growth forecast is for the TVA power service area, and DRI's growth projection is for Tennessee, Kentucky, Alabama, and Mississippi combined. We used 1994 as the base year for this analysis.

Source: GAO's analysis of TVA and DRI data.

In addition, figure II.6 shows that both DRI and the Energy Information Administration project a negative growth in manufacturing employment for the region over the same period, whereas TVA projects a slightly positive growth. Because economic growth is a key factor in determining future load growth, a lower forecast economic growth would result in lower load demand projections for TVA's power service area.

Figure II.6: Growth in Manufacturing Employment Forecast by TVA, Data Resources, Inc., and the Energy Information Administration for 1994-2004



Note: TVA's growth projection is for the TVA power service area, and the DRI and Energy Information Administration projections are for Tennessee, Kentucky, Alabama, and Mississippi combined. We used 1994 as the base year for this analysis.

Source: GAO's analysis of TVA, DRI, and DOE data.

Other Key Variables That Affect TVA's Reference Forecast Are Reasonable

According to TVA analysts, the 1995 reference load forecast is also dependent on several other key variables, including the price of natural gas and TVA's future competitive success. We found that TVA's forecast of the price of natural gas is generally comparable to projections made by DRI. However, the reasonableness of TVA's assumption about future competitive success could not be determined. These other key variables are discussed below.

- Natural Gas Prices: TVA's reference load forecast is based in part on an expectation that the average natural gas price will increase by 3.8 percent annually in nominal terms between 1993-2000. This forecast is in the general range of DRI's May 1994 forecast of 4.5 percent annual growth rate.
- Competition: TVA analysts recognize that the upcoming changes in the utility industry could have a significant impact on their competitive

position and future load forecast. However, TVA's 1995 reference load forecast assumes that TVA will neither gain nor lose customers to its competitors. Because it is unclear at this point how competition will impact TVA and the utility industry, we could not determine the reasonableness of TVA's assumption.[9]

In addition to the assumption regarding its competitive position, TVA also assumed that there will be some increase in customers generating their own electricity through cogeneration, but no increases from other electricity suppliers, such as independent power producers. According to TVA, its historical data show that in the TVA power service area, few firms are willing to develop an independent electricity plant. Assumptions made by other utilities in this area ranged from growth to no growth in these alternative power sources. Again, given the uncertainty associated with the direction of the industry, we cannot determine the reasonableness of these assumptions.

[9]TVA is currently attempting to model in a more systematic way the potential impact of a more competitive market. If successful, this information will be incorporated into the fiscal year 1996 load forecast and revised IRP.

Objectives, Scope, and Methodology

On March 9, 1994, a hearing on TVA was held by the Subcommittee on Investigations and Oversight of the House Committee on Public Works and Transportation. As a result of concerns raised during and after this hearing, several Members of the House and Senate requested that we examine various TVA issues. On the basis of subsequent discussions with the requesters' offices, we agreed to examine the implications for TVA and possibly the federal government of the financial issues facing TVA in light of the increasingly competitive electric utility market. More specifically, we agreed to provide our views on the issues that can impact TVA's financial condition, including how TVA's rates compare with those of its competitors, and examine the status of TVA's power program. In response to other issues raised, we also examined the status of TVA's Integrated Resource Planning (IRP) process (app. I), reviewed TVA's past and present load forecasting methodologies (app. II), and analyzed TVA's use of in-substance defeasance to refinance debt (app. V).

Assessing Issues That Can Impact TVA's Financial Condition

In assessing the issues that can affect TVA's financial condition, we reviewed appropriate legislation affecting TVA, such as the Tennessee Valley Authority Act of 1933 as amended, and the applicable sections of the Energy Policy Act of 1992. We discussed TVA's accounting policies and practices with its Chief Financial Officer, Treasurer, and auditor and analyzed TVA's financial statements for the past 12 years. TVA's annual financial statements are audited by Coopers & Lybrand L.L.P. (Coopers & Lybrand), an independent public accounting firm. These audits are conducted in accordance with private sector and government auditing standards. On the basis of its audits, Coopers & Lybrand issues opinions on the fairness of TVA's financial statements and on the adequacy of TVA's internal controls and compliance with key laws and regulations. Coopers & Lybrand issued an unqualified opinion on TVA's 1994 financial statements, indicating that they are fairly presented in all material respects. However, in 1994, the opinion also included a "matter of emphasis" relating to TVA's $6.2 billion of deferred nuclear assets. While it was not within the scope of our work to assess the overall quality of the auditors' work, we reviewed selected 1993 audit work papers to obtain background information. Throughout our report, where possible, we used audited numbers from TVA's 1994 and prior years' annual reports.

To determine TVA's relative financial health, we computed and analyzed five different financial indicators for TVA and neighboring investor-owned

utilities (IOU) for fiscal year 1994.[1] These indicators, which are expressed as ratios, were computed as follows.

- The ratio of financing costs to revenue was calculated by dividing financing costs by operating revenue for the fiscal year. The financing costs include interest expense on short-term and long-term debt, appropriated investment (TVA only), and preferred and common stock dividends (IOUs only). Note that preferred and common stock dividends were included in the IOUs' financing costs to reflect the difference in the capital structure of these entities and TVA.
- The ratio of fixed financing costs to revenue was calculated by dividing financing costs less common stock dividends by operating revenue for the fiscal year. Common stock dividends were excluded from the IOUs' financing costs because they are not contractual obligations that have to be paid.
- The ratio of net cash from operations to expenditures for PP&E and common stock dividends was calculated by dividing net cash from operations by expenditures for PP&E and common stock dividends for the fiscal year. Net cash from operations represents the cash received from customers minus the cash paid for operating expenses. Thus, net cash from operations represents the cash available for expenditures for PP&E, common stock dividends (IOUs only), and other investing and financing transactions. Again, we included common stock dividends in the IOUs ratios to reflect the difference in cash flow requirements for these entities and TVA.
- The ratio of accumulated depreciation and amortization to gross PP&E was calculated by dividing accumulated depreciation and amortization by gross PP&E at fiscal year-end.
- The ratio of deferred assets to gross PP&E was calculated by dividing deferred assets by gross PP&E at fiscal year-end. Deferred assets include construction in progress and deferred nuclear units (TVA only). Deferred nuclear units are included for TVA because they are treated by TVA as construction in progress (i.e., not depreciated).

For purposes of this report, we refer to utility holding companies and their subsidiaries as IOUs. We limited our selection to nine IOUs that border on TVA's service area because industry experts told us that due to the cost of transmitting electricity, TVA's competition would most likely come from IOUs located close to its service area. In addition, some of these utilities have submitted bids to provide electricity to TVA customers who are seeking power sources other than TVA. We did not include any publicly

[1]The fiscal year ends for TVA on September 30 and the IOUs on December 31.

owned utilities in our analysis because the publicly owned utilities that provide electricity in the states served by our IOU comparison group generally only distribute but do not generate electricity. The IOUs and their subsidiary utilities used in our comparisons included: (1) American Electric Power, Inc. (including Appalachian Power, Columbus Southern Power, Indiana Michigan Power, Kentucky Power, Kingsport Power, Ohio Power, and Wheeling Power), (2) Carolina Power and Light Company, (3) Duke Power Company, (4) Dominion Resources, Inc. (including North Carolina Power and Virginia Power), (5) Entergy Corporation (including Arkansas Power and Light, Gulf States Utilities, and Mississippi Power and Light), (6) Illinova Corporation (including Illinois Power), (7) KU Energy Corporation (including Kentucky Utilities), (8) LG&E Energy Corp. (including Louisville Gas and Electric), and (9) The Southern Company (including Alabama Power, Georgia Power, Gulf Power, and Mississippi Power). The financial data used in computing the ratios were obtained from the audited financial statements in the utilities' fiscal year 1994 annual reports.

We reviewed the financial statements contained in the 1993 and 1994 annual reports of TVA and the IOUs. To obtain information on various issues facing utilities, we also reviewed the management discussions and analyses contained in TVA's 1993 and 1994 annual reports, and the IOUs' 1993 annual reports. These issues included competition, energy arrangements with other utilities, nuclear power issues, efforts and costs related to meeting the Clean Air Act requirements, capital structure, growth rates, accounting issues that could affect the utilities' current and future financial condition, and electricity rates. In addition, we contacted financial analysts to identify the criteria they use to evaluate the financial condition of electric utilities.

We discussed TVA's current financing and investment policies and strategies with TVA's Chief Financial Officer and Treasurer. We discussed TVA's financing policies and current borrowing options with an official at the Federal Financing Bank (FFB). We also interviewed government bond analysts at Moody's and Standard & Poor's—two major bond rating organizations—to determine the factors that underlie TVA's "AAA" bond rating. In addition, we examined TVA's in-substance defeased debt issues (as discussed in appendix V) to determine if this debt should apply against TVA's $30 billion borrowing limit. We also discussed TVA's December 12, 1994, Report on Controlling the TVA Debt (debt study) with TVA's Chief Financial Officer.

In comparing retail rates, we calculated the average system, residential, commercial, and industrial rates for TVA's nine neighboring IOUs by dividing the revenue from the sale of electricity to each group by the respective total kilowatt hours sold. Residential sales are to households, and industrial sales are to businesses generally engaged in mining or manufacturing. Commercial sales are to businesses not covered in the industrial category. We recognize that most of TVA's sales are at the wholesale level. However, to compare TVA to IOUs, we obtained TVA's retail rates from its December 1994 Report on TVA's Nuclear Options.

To analyze the effect of TVA's nuclear construction program on TVA's future rates, we estimated amortization and/or depreciation expense for TVA's investment in nuclear assets over the likely amortization and/or depreciation time periods. These investments are currently excluded from TVA's rates.

We examined the increase in competition among electric utilities caused by the Energy Policy Act of 1992 and TVA's prospects for competing successfully in the evolving market. We contacted the Edison Electric Institute, American Public Power Association, and the National Rural Electric Cooperatives Association, as well as individual electric utilities or utility holding companies, such as American Electric Power, Dominion Resources, and KU Energy, and we reviewed their financial reports and resource plans to determine (1) past resource decisions that could enhance or decrease their competitiveness, (2) current plans for responding to increasing competition, and (3) relative financial well-being.

We contacted national and regional associations[2] that represent TVA's electricity distributors and large industrial customers to understand their concerns about TVA's future competitiveness and future rates. For a more detailed examination of these topics, we interviewed officials from TVA's largest distributors (representing about 29 percent of TVA's power demand), including the municipal utilities of Memphis, Nashville, Knoxville, and Chattanooga, Tennessee and Huntsville, Alabama. We also interviewed officials from the Decatur and Fort Payne, Alabama, utilities in order to gain the perspectives of TVA's smaller municipal customers. We interviewed officials from the municipal power agency in Bristol, Virginia, and the Four County Electric Power Association in Columbus, Mississippi, because these utilities, along with the Memphis utility, have explored leaving the TVA power system to procure cheaper power from other

[2]The National Rural Electric Cooperatives Association, American Public Power Association, Tennessee Valley Public Power Association, Electricity Consumers Resource Council, and the Tennessee Valley Industrial Coalition.

suppliers. In addition, we analyzed the provisions of TVA's contracts to determine how difficult it would be for a TVA distributor to end its contract and leave the TVA system.

Assessing the Status of TVA's Power Program

In assessing the status of TVA's power program, we examined the history and current operation of TVA's nuclear power program, and TVA's prospects for having the Watts Bar 1 and Browns Ferry 3 nuclear units in operation by 1995 and 1996, respectively. We focused on TVA's nuclear power program because it is associated with a substantial portion of TVA's $26 billion debt, and because it has experienced problems over the past 20 years.

We interviewed TVA's Vice President of Nuclear Operations and the Executive Staff Support Manager for Nuclear Operations; and we discussed the current and past construction and operational problems of the Browns Ferry, Sequoyah, and Watts Bar nuclear units with the Vice President of each of the nuclear plants. We discussed current and past safety and licensing issues at TVA's nuclear plants with various officials of the Nuclear Regulatory Commission (NRC), including the Director for the Office of Nuclear Reactor Regulation, the Regional Administrator for NRC Region II, the Branch Chief for Nuclear Licensing Renewal, and the Senior Resident Inspector at the Watts Bar Nuclear Plant. We also met with the Vice President for Governmental Affairs at the Institute for Nuclear Power Operations.

We reviewed previous GAO, TVA, and NRC reports on TVA's nuclear power program. We also examined TVA and NRC reports regarding allegations of safety, engineering, operational, and managerial problems. Many of these allegations are significant because NRC has determined that TVA must resolve them to NRC's satisfaction before TVA can bring into commercial operation its Watts Bar 1 and Browns Ferry 3 nuclear units. We also reviewed NRC's most recent "Systematic Assessment of Licensee Performance" reports for each of TVA's nuclear units, because these reports provide information on how well nuclear plant management is directing operations and providing needed resources to assure plant safety.

We examined data on how much power was generated by TVA's nuclear units from each unit's initial date of commercial operation through the end of fiscal year 1994. We reviewed TVA documents showing the unplanned

and planned outages at each of TVA's nuclear units from first commercial operation date through fiscal year 1994.

For TVA's Watts Bar 1 and Browns Ferry 3 nuclear units, we reviewed TVA documents showing historic and recent construction schedule slips and cost overruns, and cost estimates to complete these units from 1990 to 1994. We discussed TVA's decision to complete the Watts Bar 1 and Browns Ferry 3 nuclear units with TVA resource planning officials. We also reviewed TVA's costs and assumptions included in its incremental cost analysis for completing these units. Using TVA's methodology, we conducted our own incremental cost analysis on Watts Bar 1, using less optimistic assumptions than those considered by TVA. We used our Watts Bar 1 analysis for illustrative purposes in this report.

We also reviewed TVA's program for operating, maintaining, and upgrading its nonnuclear power assets, primarily its hydroelectric and coal-fired units. The hydroelectric and coal-fired units are important because they accounted for an average of 86 percent of TVA's electric power during fiscal years 1980 to 1994. These units also supplied the bulk of TVA's power during 1986 and 1987 when TVA's nuclear operations were completely shut down. During this time, TVA relied on its nonnuclear power plants in order to satisfy almost all of its customers' requirements.

For TVA's hydroelectric and coal-fired units, we obtained and analyzed data from fiscal years 1980 to 1994 on annual generation; capital expenditures; operating and maintenance expenditures; unit availability to produce power; and planned, unplanned, and maintenance outage rates. We also reviewed TVA's projected capital and operating and maintenance costs through the year 2020. We obtained data on the age of the coal-fired and hydroelectric units; plans to upgrade or retire these units; and TVA's assessments of its costs of complying with environmental requirements, including Clean Air Act requirements. We discussed operations and expenditures with various TVA officials, including the Manager of Fossil and Hydro Generation Planning and the Manager of Financial Services.

Determining the Status of TVA's Integrated Resource Planning Process

To examine the status of TVA's IRP process, we reviewed the requirements for the process as established in the Energy Policy Act of 1992. We also attended TVA's monthly IRP meetings between July 1994 and March 1995 and interviewed responsible TVA officials. We reviewed various documents pertaining to the IRP process. These included documents on TVA's projected need for additional power resources, such as its December 1994 report

entitled, Report on TVA's Nuclear Options; demand- and supply-side resources proposed by TVA in its IRP process; and planning considerations that TVA associated with a cleaner environment. We also contacted members of TVA's "Review Group," which is providing TVA with advice on its IRP process and resources the IRP should consider.

We monitored the progress of outside consultant reviews of TVA's IRP process by discussing the status of the consultants' work with TVA officials and stakeholders, and by obtaining and examining documentation that describes the scope and status of the consultants' work.

We did not review the effectiveness of TVA's IRP process because it was still subject to change during the course of our review, and the final IRP plan was not scheduled to be completed until December 1995.

Assessing TVA's Past and Present Load Forecasting Methods

To gain an understanding of TVA's load forecasting process, we examined TVA's past and present methodology for projecting electricity load. We interviewed TVA's load forecasting officials and reviewed energy and economic forecasting documentation that describes TVA's forecasting methodology. To compare TVA's forecasting models and methods against the state-of-the-art forecasting practices within the utility industry, we interviewed forecasting experts at the Electric Power Research Institute, Lawrence Berkeley Laboratory, Edison Electric Institute, Energy Information Administration, and several energy consulting firms, including Barakat and Chamberlin, LCG Consulting, and HBRS. We also obtained and reviewed modeling documentation provided by these organizations.

We compared TVA's methodology with the methodologies of other utilities by interviewing forecasting officials and reviewing forecasting documentation at a number of utilities or utility holding companies in the Southeast, including Dominion Resources, Kentucky Utilities, and Duke Power. We also interviewed forecasting officials from the Wisconsin Electric Power Company, New England Electric Systems, Pacific Gas and Electric Company, and the California Energy Commission.

To examine the accuracy of TVA's historic load forecasts, we compared its annual net system requirement forecasts from 1970 to 1991 with the actual net system requirements for the same years. We used standard measures of accuracy, such as the mean absolute percentage error and the root mean square error, in our evaluation of each forecast year. To assess the relative accuracy of TVA's forecasts, we reviewed the forecasting literature

and discussed historical forecasts with officials from other utilities, including Wisconsin Electric Power Company, Duke Power, and Kentucky Utilities.

To examine the reasonableness of TVA's fiscal year 1995 long-term load forecast, we compared it with the load forecasts of neighboring utilities, including Virginia Power/North Carolina Power, Duke Power, and Kentucky Utilities. We evaluated the reasonableness of TVA's economic assumptions by interviewing economists at 11 different universities in or near the TVA service area. We also compared TVA's 1994 regional economic forecast with comparable regional forecasts, including those produced by Data Resources, Inc., and the Energy Information Administration.

Our evaluation of TVA's forecasting system was limited to a review of the overall integration of the load forecasting system, the general structure of the individual forecasting models, and TVA's uncertainty analysis. We did not evaluate TVA's calibration of equations or models, or the specific input data used to develop the load forecasts.

A list of the organizations and groups we contacted during the course of our work follows. We conducted our review between June 1994 and July 1995 in accordance with generally accepted government auditing standards. We obtained written TVA comments on a draft of our report, which are contained in appendix IV. We also requested and received comments from two external reviewers—Mr. Charles Luce[3] and Mr. Robert Fri[4]—on a draft of this report. Both reviewers concurred with the overall message and conclusions of our draft report and offered other comments that we have incorporated in this report, where appropriate.

[3]Mr. Luce is the retired Chairman of the Board and CEO of Consolidated Edison of New York and is currently a consultant for Consolidated Edison. He is also a former Undersecretary of the U.S. Department of the Interior and Administrator of the Bonneville Power Administration. In addition, Mr. Luce was a member of the Southern States Energy Board Advisory Committee on the Tennessee Valley Authority that issued the 1987 report entitled TVA—A Path to Recovery.

[4]Mr. Fri is President of Resources for the Future. He is also a former Deputy and Acting Administrator for the Environmental Protection Agency and a former Deputy and Acting Administrator for the Energy Research and Development Administration. In addition, Mr. Fri was a member of the Southern States Energy Board Advisory Committee on the Tennessee Valley Authority that issued the 1987 report entitled TVA—A Path to Recovery.

Organizations and Groups That GAO Contacted

Federal Agencies	Bonneville Power Administration Department of Energy, including the Energy Information Administration Environmental Protection Agency Federal Energy Regulatory Commission Federal Financing Bank Nuclear Regulatory Commission, Headquarters, Atlanta Region, TVA Sites
Bond Rating Agencies and Financial Analysts	Standard & Poor's, New York, NY Moody's Investors Service, New York, NY Fitch Investors Service, Inc., New York, NY
Independent Public Accounting Firm	Coopers & Lybrand L.L.P.
Neighboring Electric Utilities or Holding Companies	American Electric Power, Columbus, OH Dominion Resources (Virginia Power/North Carolina Power), Richmond, VA Kentucky Utilities, Lexington, KY
Load Forecasting Experts, Resource Planning Experts, and Regional Economics Experts	Barakat and Chamberlin, Inc., Oakland, CA California Energy Commission, Sacramento, CA Oak Ridge National Laboratory, Oak Ridge, TN New England Electric Systems (load forecasting unit), Westboro, MA Duke Power Company, Charlotte, NC Kentucky Utilities, Lexington, KY Pacific Gas and Electric Company, San Francisco, CA Wisconsin Electric Power Company, Milwaukee, WI Lawrence Berkeley Laboratory, Berkeley, CA Electric Power Research Institute, Palo Alto, CA Data Resources, Inc., Lexington, MA

LCG Consulting, Los Altos, CA
HBRS, San Francisco, CA
XENERGY, Inc., Burlington, MA
Mississippi State University, Starkville, MS
University of Tennessee at Martin, Martin, TN
East Tennessee State University, Johnson City, TN
Memphis State University, Memphis, TN
Middle Tennessee State University, Murfreesboro, TN
Eastern Kentucky University, Richmond, KY
University of Alabama at Huntsville, Huntsville, AL
Tennessee State University, Nashville, TN
Virginia Tech, Blacksburg, VA
Western Carolina University, Cullowhee, NC
Louisiana State University, Baton Rouge, LA

Trade or Interest Group Associations

American Public Power Association, Washington, DC
Edison Electric Institute, Washington, DC
Electricity Consumers Resource Council, Washington, DC
Institute for Nuclear Power Operations, Atlanta, GA
National Rural Electric Cooperatives Association, Washington, DC
Tennessee Valley Industrial Coalition/Associated Valley Industries, Columbia, TN
Tennessee Valley Public Power Association, Chattanooga, TN
Tennessee Valley Energy Reform Coalition, Knoxville, TN

TVA Distributors

Bristol, VA
Chattanooga, TN
Decatur, AL
Huntsville, AL
Four County Electric Power Association, Columbus, MS
Fort Payne, AL
Knoxville, TN
Memphis, TN
Nashville, TN

Comments From the Tennessee Valley Authority

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

Craven Crowell
Chairman, Board of Directors

June 15, 1995

The Honorable Charles A. Bowsher
Comptroller General of the United States
General Accounting Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Bowsher:

Enclosed is TVA's official response to the General Accounting Office draft report on our operations, issued at the exit meeting June 1, 1995.

As detailed in the response, we at TVA strongly disagree with GAO's assessment in many areas. TVA is a financially healthy corporation. We are well able to service our debt, now and in the future. And we have made the tough decisions necessary to prepare for the coming era of deregulation and competition in the utility industry.

As I have stated before, I am concerned that GAO staff members responsible for this report lack an adequate, in-depth understanding of the electric-utility industry and have therefore produced a report characterized by inaccuracies, false assumptions, and misleading information.

The thrust of GAO's analysis consistently misrepresents (1) TVA's actions to manage and control its debt, (2) TVA's sound capital structure, and (3) TVA's ability to compete in a deregulated market.

It is especially surprising to note that---even though the GAO staff has been extensively involved with TVA's Integrated Resource Planning process over the course of an entire year---the draft report ignores the IRP's findings and preliminary recommendations on future resource decisions and costs.

Ironically, the GAO team has drawn many of its comments from interviews with nine investor-owned utilities surrounding TVA's service area--in other words, our competitors. While this is an appropriate source of information, the direction of this draft report clearly has been guided by those parties most interested in seeing the TVA power system dismantled. TVA is preparing for a vigorous competitive marketplace--a reality that, understandably, inspires mixed feelings among our competitors.

I urge you to carefully review our comments and incorporate them into the final GAO report. To be credible and useful, this report should accurately reflect the true conditions in the electric-utility industry, and it should recognize the significant steps already taken to strengthen TVA's competitive position. To help GAO accomplish this, our comments today meet the two-week deadline we were given for responding to the draft report. In addition, I would appreciate the opportunity to expand or update our comments as we further analyze the draft. Also, I have enclosed comments on the draft from Palmer Bellevue, the strategic-consulting arm of Coopers & Lybrand and recognized experts in the utility industry.

I look forward to reading the final report, with the hope that our comments will positively shape the content of the final report and result in a title that reads, "TVA--Prepared for the Challenges of the New Electric-Power Marketplace."

Sincerely,

Craven Crowell

Enclosures

TVA's Comments on the General Accounting Office Report

June 15, 1995

Note: GAO comments on TVA's executive summary are found in chapter 5.

Executive Summary

The General Accounting Office's draft report on the operations of the Tennessee Valley Authority is inaccurate in its analysis of TVA's financial condition.

Throughout its report, GAO makes inappropriate comparisons between TVA's capital structure and those of investor-owned utilities (IOUs). TVA can raise capital only by issuing debt. In addition to issuing debt, IOUs can raise capital by selling common and preferred stock.

TVA's debt, which totals some $27 billion, is not out of line with the total capitalization of other utilities. More importantly, TVA's yearly revenues of more than $5.4 billion are well able to pay the debt service, which was about $1.9 billion last year. As indicated below, this will still be true when TVA's last two nuclear units, Watts Bar Unit 1 and Browns Ferry Unit 3, go into service in early 1996. The debt does not place U.S. taxpayers at risk, nor does it keep TVA from being competitive.

Since 1988, TVA has taken significant actions to improve its financial position—notably reducing the workforce by half (from 34,000 to 16,500), cutting expenses throughout the corporation by $800 million. More recently, TVA decided ***not*** to complete its remaining nuclear units under construction as nuclear units and to cap the debt below the statutory limit set by Congress. These steps have been taken under the pressure of real-world competition and the mandates of effective leadership.

As a result of the measures above, TVA has gone without a general rate increase since October 1987. In that time, TVA's rates have improved from 48th to 30th least expensive among 130 utilities nationwide. Since stable rates are TVA's single most important tool for promoting economic development in the Tennessee Valley and for maintaining its competitive position in the marketplace, TVA has established a goal of continuing without an increase until at least 1997.

On March 9, 1994, the House Transportation Committee's Subcommittee on Investigations and Oversight held a hearing to review TVA's power system and financial condition. As a follow-up to the hearing, the Committee asked the General Accounting Office to conduct a formal review of TVA's operations. The draft report to which TVA is responding is the result of that review.

Capital Structure

GAO's analysis of TVA's financial condition is flawed at best. The GAO faults TVA for having too little equity, while ignoring the fact that TVA is prohibited by law from issuing equity and discouraged by law from accumulating equity through profits and retained earnings.

As mentioned, the GAO report presents a misleading view of TVA's debt, both in comparisons with neighboring utilities and in analyzing TVA's competitive position for the future.

IRP Conclusions and the Nuclear Debt

In its analysis of TVA's debt, GAO specifically misrepresents construction projects in progress as "$14 billion in deferred assets." What GAO fails to acknowledge is that in order to include the $14 billion in "deferred assets" in its rates, TVA would have to begin depreciating these assets ***before*** putting them into service. This would violate generally accepted accounting principles and industry practices. GAO also fails to acknowledge the preliminary findings of TVA's Integrated Resource Plan, which indicate that Watts Bar Unit 1, as well as Browns Ferry Unit 3--together accounting for $7.8 billion of the $14.8 billion of

construction in progress--will go into service in the first quarter of 1996 and will be revenue-producing. Contrary to the implications in the GAO report, no rate increase will be necessary for the start-up of these two nuclear units.

Cash-Flow Stability

TVA generates more than sufficient cash to fund its ongoing operations and to service the debt. TVA, like many industrial companies, borrows to finance growth. Once it completes Watts Bar 1 and Browns Ferry 3 in the first quarter of 1996, TVA's need for capital will decrease significantly, which will continue to improve its competitive position within the region.

Competition

"From a competitive standpoint, TVA's financial condition is likely to be able to withstand the pressures of a more intense competitive market in the regional electric industry," says *The Ties That Bind*, a study by Palmer Bellevue, the strategic-consulting arm of Coopers & Lybrand. "Overall, TVA is ready for competition," concludes Palmer Bellevue. "Competition will make it leaner and more responsive than ever to its wholesale customers and more creative in its mission." The bottom line, from TVA's standpoint, is that deregulation in the utility industry is here, and that TVA, as a corporation, is ready to compete, not retreat.

In establishing a new direction for TVA, the Board has drawn a clear line between the past and the future. The Board has set a limit on total TVA borrowings. It has used TVA's first Integrated Resource Plan to begin acquiring needed resource options through a competitive process. It has suspended construction on three nuclear units and completed a 50-percent reduction in its workforce. Moreover, the Board has embarked on a conscious process to fully re-direct TVA toward a future dominated by competition.

Options and Increased Oversight

Few utilities operate under as much oversight and scrutiny as TVA. Because TVA is a public corporation, TVA's records, meetings, and business deliberations are more open to the public than those of a private corporation. Each year, TVA's Appropriations subcommittees perform annual oversight of power and non-power issues, and jurisdiction committees in Congress have held a number of oversight hearings. Moreover, the marketplace conducts the toughest oversight possible.

To compete effectively in this competitive business environment, TVA must be free to make sound business decisions in order to meet the needs of its customers. TVA cannot afford to fashion its decisions on the parochial interests of a select group of political regulators. GAO first advocates such a free-market approach for TVA's operation. Then, unfortunately, it reverts to traditional government recommendations for increased layers of government bureaucracy.

The very first option listed in the GAO report is for Congress to continue its current oversight of TVA and allow the forces of the marketplace to continue to motivate TVA to improve as a competitive entity. It is the opinion of TVA's leadership that this option best serves TVA ratepayers and the federal government.

See comment 1.

Chapter 1—

Introduction

TVA's Electric-Power System

In Chapter 1, and throughout its draft report, GAO makes inappropriate and inaccurate comparisons. The electric-utility industry in the United States consists of two distinct kinds of systems: privately owned electric systems and publicly owned electric systems. Public electric systems—consisting of federal, state, municipal, and cooperative systems—comprise 25 percent of the electric-utility industry. GAO consistently compares regulatory characteristics of most private systems with those of a public system—TVA. Typically, public systems are not subject to most public-utility-commission regulations that apply to private systems. Nor are the wholesale power rates or other aspects of their operation subject to FERC regulation.

The GAO report describes TVA power rates as not being subject to public-utility-commission review "unlike other utilities" and notes that TVA is not "encumbered" by regulatory and oversight requirements that must be satisfied by other utilities. The report also includes a lengthy description of FERC's regulatory jurisdiction (except that part which TVA is subject to) and notes that TVA is not subject to the "regulatory environment faced by other utilities." The fact remains that TVA is subject to transmission wheeling across the power system.

The differences in the amount of regulation of public and private electric systems are long-standing, and these differences are appropriate. Extensive regulatory oversight has been deemed desirable for private systems to ensure that owners/stockholders do not make unreasonable monopoly profits at the expense of customers. In contrast, nonprofit public systems exist solely for the consumers' benefit. Publicly-owned utilities are overseen by municipal boards, independent boards, or boards comprised of customer owners. Generally, publicly-owned utilities are exposed to greater public scrutiny because of their stated existence for the benefit of public.

TVA was conceived and born into competition—competition that the large, private power conglomerates vigorously opposed. TVA competed so well in fact that electric-power users chose TVA as their preferred supplier and abandoned private power companies because of competitive rates and reliable service. In the 1950s, the private power companies responded by lobbying Congress to deny TVA the capital investment needed to meet the region's growing demand for electric power. When this matter resolved itself with TVA's new, self-financing authority, the private power companies insisted that a tight line be drawn around TVA to ensure that it could no longer compete with them.

The so-called "TVA fence" in section 15d of the TVA Act has for more than three decades protected private power companies from having to compete with TVA. When FERC was first given wheeling authority—by the Public Utility Regulatory Policies Act of 1978—those same private power companies sought and obtained a special provision in the Federal Power Act to ensure that the new wheeling authority would not allow TVA to breach the "fence."

In spite of the pro-competition nature of much of the Energy Policy Act of 1992, as

this law moved through Congress no one—certainly not the private power companies—sought to eliminate the fence. As a result, private power companies could have used FERC's new wheeling authority to compete for TVA's wholesale customers while TVA still couldn't compete for theirs. This one-sided competitive environment was unacceptable to TVA and the 160 wholesale distributors of TVA power.

The Ties That Bind, a recent report prepared by Palmer Bellevue, the strategic consulting arm of Coopers & Lybrand, recommends a two-step process to eliminate this anachronistic law. The GAO report expresses private power companies' arguments against removing the fence, then erroneously concludes that removing the fence is a bad idea since TVA probably could not compete successfully.

Page **2**

See ch. 5.

See comment 2.

See ch.5.

Chapter 2—

TVA's Financial Condition and Competitive Position

GAO's entire analysis of TVA's financial position, as illustrated primarily in Chapter 2, rests heavily on this statement found on page 28 of the draft report:

"At the same time, $14 billion of non-producing nuclear assets have not been included in TVA's revenue requirements and are thus excluded from current rates."

GAO implies that TVA's $14 billion in "deferred assets"--actually construction projects in progress or incomplete plants--should be included in TVA's revenue requirements and rates. To do this, TVA would have to begin depreciating these assets before to putting them into service. This would violate generally accepted accounting principles as well as industry practice.

It is disturbing that GAO has based so little of its analysis on the initial findings of TVA's Integrated Resource Planning process—-a process GAO has followed closely. The IRP indicates that Watts Bar Unit 1 and Browns Ferry Unit 3 will go into service in the first quarter of 1996 and be revenue-producing. Together, they account for $7.8 billion of the $14 billion in "deferred assets." A significant portion of the remaining $6.2 billion may be used as part of the Bellefonte conversion to natural gas or gasified coal. The remaining portion has also been addressed in detail through the IRP process.

Among its preliminary recommendations, the IRP calls for maintaining low rates (that is, stable through 1997 and rising below the rate of inflation from 1998 to 2002), capping the debt below the $30 billion statutory limit, improving the environment, and enhancing economic development.

TVA's Capital Structure Compared with Investor-Owned Utilities

When comparing TVA's financing costs with those of IOUs, interest is not the only factor to consider. TVA can raise capital only by issuing debt. In addition to issuing debt, IOUs can raise capital by selling common and preferred stock. According to Bear, Stearns, & Co. Inc. research, IOUs raise 48 percent (42 percent common stock and 6 percent preferred stock) of their capital by selling stock. The IOUs that GAO compares to TVA raise 68 percent (61 percent common stock and 7 percent preferred stock) of their capital from stock. This leaves only 32 percent for debt compared to TVA's 100 percent.

Based on total capitalization, TVA is not out of line with IOUs. As shown in the following table, TVA ranks just 0.7 percent below the average of the IOUs that GAO compares with TVA.

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See ch. 5.

Market Value Capitalization Comparison
As Of December 31, 1993
(Thousands of Dollars)

Utility	Installed Capacity	Capitalization	Deferred Taxes (Govt. Loans)	Total Capitalization	Capitalization Per MW ($)
KU	3,164	1,893,737	322,878	2,216,615	701
AEP	25,179	$14,508,687	$3,364,714	$17,873,401	710
Duke	17,845	15,172,725	2,609,830	17,782,555	997
Entergy	21,257	19,083,639	4,814,616	23,898,255	1,124
Ill Power	4,721	4,167,024	1,168,900	5,335,924	1,130
TVA	**28,410**	**33,314,612**	*	**33,314,612**	**1,173**
LG&E	2,693	2,863,960	389,795	3,253,755	1,208
Dominion	13,265	15,072,681	1,908,800	16,981,481	1,280
Carolina P&L	9,613	11,625,793	1,849,078	13,474,871	1,402
Southern	29,513	41,168,461	6,136,000	47,304,461	1,603
IOU Average	14,139	13,950,745	2,507,179	16,457,924	1,164

NOTE: "Installed Capacity" and "Capitalization" amounts were taken from Table 3-7 in the Palmer Bellevue Report.
*TVA's "Government Loans" are included in Palmer Bellevue's "Capitalization" amount.

When making comparisons based on total means of financing, TVA is not out of line with the IOUs. In addition, TVA—unlike most IOUs—is completing a major capital program to expand capacity. Historically, TVA has opted for higher capital cost and lower O&M cost facilities. This lower O&M cost puts TVA in a better position to compete for additional sales over the long haul.

See comment 3.

TVA's residential rates are the lowest among the surrounding IOUs. While TVA has included the interest component of "deferred assets" in current rates, IOUs have not included any costs associated with these assets. As noted earlier, TVA's low O&M costs will be a crucial factor in future rates.

See comment 4.

GAO refers incorrectly to the $600 million of funds and property transferred to TVA by the federal government as debt. This is appropriation investment. GAO is also in error in stating that TVA is required to repay that $600 million. TVA is required only to repay approximately $300 million.

See comment 5.

The $200 million owed to the U.S. Treasury noted in footnote 5 is a $150-million line of credit. As with most lines of credit, TVA pays interest only on the amount being used. Footnote 7 is also in error. Capitalization should include direct government loans which are in the form of current taxes payable, deferred taxes payable, and deferred investment-tax credits payable.

See comment 6.

GAO implies that TVA operates under no oversight in borrowing against its $30-billion debt limit. In fact, TVA is subject to Congressional review at all times and annually presents its power budget and projected borrowings to Congress and the Office of Management and Budget. The statutory debt ceiling was set by Congress.

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See ch. 5.

Incomplete Nuclear Power Assets/Construction in Progress
GAO incorrectly concludes that TVA's incomplete plants would increase its revenue requirements by a total of $454 million per year for at least the next 22 years. GAO admits that TVA's average system rate is currently competitive.

GAO then asserts that once the costs of non-producing nuclear assets for completing Watts Bar Unit 1 and Browns Ferry Unit 3 are figured into TVA's revenue requirements "it will be difficult for TVA to offer rates competitive with its neighbors." This statement is incorrect, and here GAO wrongly translates revenue requirements into electric rates. As mentioned earlier in this document, the IRP indicates that increases in sales will cover the cost of bringing the new units into service (see chart below). Since TVA already includes interest and operating costs in its rate base, depreciation (which is approximately one third of interest costs) is the only major item to be added. IOUs include interest costs in their accounting only after an asset is categorized as a completed plant.

Watts Bar Unit 1 and Browns Ferry Unit 3
Net Return (Revenue versus Cost)

	Watts Bar Unit 1	*Browns Ferry Unit 3*
Depreciation *(in millions)*	127	101
O&M	94	76
Fuel	26	34
Total Cost	247	211
Revenue	328	298
Net Return	81	87

See comment 7.

TVA's IRP process and the Palmer Bellevue report conclude that TVA will be able to compete with neighboring IOUs. GAO does not accurately reflect the value of TVA's assets because GAO uses the book value instead of the market value of assets. Even so, the high ratio of nuclear investment has two principal explanations. First, the nuclear facilities are, by nature, more expensive to build but less expensive to operate than other generating facilities. This is the economic trade-off many utilities make.

Second, TVA's nuclear facilities are its newest facilities. Therefore, they are the least depreciated in its asset portfolio. Indeed, much of the nuclear investment has not been completed and converted to operational status, so no depreciation has been recognized. In contrast, TVA's hydro facilities, which have tremendous real value, have been almost totally depreciated (for accounting purposes) and appear to have no value on TVA's PP&E account. The fallacy of using book rather than market value for assets is best illustrated by GAO's Figure 2.1, in which Hydro & Multi-Purpose Generation accounts for only 2.9% of Net Book PP&E Assets but 15.4% of total generation.

Page **5**

See comment 8.

TVA vs. AEP Comparison
GAO indicates that IOU dividends are not contractual obligations and should not be compared to TVA's fixed-interest payments. While it's true that dividends are not contractual obligations, if dividends are not regularly paid, the value of the stock would likely be significantly reduced and the market for new stock issues jeopardized. Given the typical utility shareholder mix, dividends are for all practical purposes a fixed cost and should be used in comparisons to TVA debt.

See comment 9.

It is incorrect to state that TVA and American Electric Power have about the same capacity. Actually TVA has about twice the assets. GAO includes "deferred assets" but does not include the capacity represented by these "deferred assets." As noted on the table below, TVA and AEP have about the same generating assets and dependable capacity per generating asset.

System Comparison of TVA and AEP
Fiscal Year 1994
Amounts in Millions of Dollars

	TVA	AEP
Total Assets	$ 31,842	$ 15,713
Less: Current Assets	1,025	1,282
Investments	150	735
Deferred and Other Assets	2,596	2,348
Property, Plant and Equipment	28,071	11,348
Less Construction in Process & Deferred Units	15,726	259
Net Generating Assets	**$ 12,345**	**$11,089**
Dependable Capacity (MW)	**25,913**	**23,670**
Dependable Capacity per Generating Asset	**2.10**	**2.13**

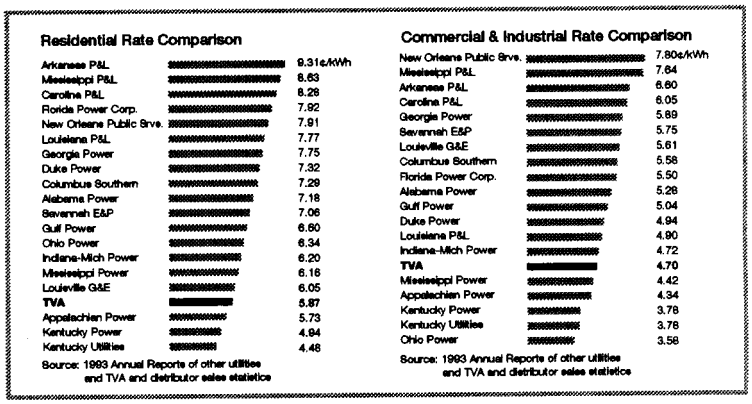
See comment 3.

TVA's Retail Rates Are Competitive
The GAO report describes TVA's rates as "mixed." In fact, TVA's rates are not "mixed." TVA's rates are generally among the lowest in the region compared with neighboring utilities. TVA's residential rates are lower than its neighbors due, in part, to allocating 100% of the benefits of its low-cost hydroelectric generation to residential customers. TVA's commercial and industrial rates are also below the average of neighboring utilities (see chart on following page).

Page **6**

See comment 10.

Once again GAO makes the error of translating revenue requirements into electric rates. Increases in sales will cover the cost of bringing on new units. This concept is indicated in the IRP process, which the GAO reviewed extensively. In fact, as the industry moves toward deregulation, the regulatory concept of revenue requirements will give way to revenue driven by market forces. And while it's true that Kentucky Utilities (KU) has invested less in plants and has lower rates, it's also true that KU has no new plants and therefore has no capacity to market in competition with TVA. Moreover, the same graph showing that KU has invested less that TVA and has lower rates also shows that Entergy has invested less and has higher rates. The comparison is meaningless.



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See comment 11.

See comments 2, 14, and 22.

See comment 11.

See comment 12.

Chapter 3—

TVA's Nuclear Power Program

While TVA's nuclear program has experienced cost overruns in the past, its recovery/construction process is nearing completion and faces no further significant delays. Browns Ferry 3 is on schedule, within budget targets, and faces no NRC obstacles to restart. In its analysis of TVA's nuclear program, GAO misrepresents the relationship of TVA's capital expenditures to its nuclear costs and also fails to:

- demonstrate a relationship between capital spending and performance of the fossil/hydro system
- analyze the projected level of spending on these plants relative to other TVA needs or typical industry spending
- prove that funds would not be available to meet fossil/hydro capital spending needs

Throughout this chapter, GAO's incorrect analysis of first-year operating costs for nuclear units leads to erroneous conclusions about expected costs. The IRP includes extensive analysis of the cost to complete TVA's nuclear units, expected capacity factors, operating and maintenance costs, the need for additional power supplies, fossil system operating performance and Clean Air Act requirements. This thorough analysis has been extensively reviewed by a panel of experts independent of TVA and has not indicated any potential conflicts.

Construction: Watts Bar Unit 1 and Browns Ferry Unit 3
Suggestions that delays and cost overruns at Watts Bar 1 and Browns Ferry 3 could affect capital funds available for needed improvements to fossil and hydroelectric plants are incorrect. In fact, TVA continually reviews its capital spending priorities and makes adjustments as necessary to meet the highest priority needs. In addition, TVA has been funding major capital improvements to its coal and hydroelectric plants at the same time that it is completing Watts Bar 1, recovering Browns Ferry 3, and meeting Clean Air Act requirements. This fact is clearly demonstrated by Figure 3.4 on page 63 of GAO's report.

Watts Bar/NRC Licensing
In this chapter, GAO states that "Although TVA certified to NRC that Watts Bar 1 qualified for an operating license 1985, NRC has not yet granted one." GAO implies that TVA has continued to maintain that Watts Bar 1 qualifies for an operating license when in fact TVA acknowledged that Watts Bar suffered from design and construction problems, has undertaken significant corrective actions, and has not yet recertified to NRC that Watts Bar 1 is ready for an operating license.

TVA and NRC agreed on the 27 major corrective-action programs in 1989. Since that time, NRC has overseen the implementation of the programs.

GAO states that at an October 1994 meeting with NRC, TVA's management disclosed numerous construction problems. Based on this meeting, GAO draws sweeping conclusions about the progress of the entire corrective-action process at

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Watts Bar. The problems disclosed by TVA management were restricted to a few specific areas and have been satisfactorily corrected. NRC has acknowledged this in more recent meetings and has expressed satisfaction with the progress of the corrective actions and overall licensing effort at Watts Bar.

See comment 13.

Browns Ferry Unit 3
"As of December 1994, TVA officials reported that current expenditures at Browns Ferry were still in line with its August 1993 estimate." In fact, the Browns Ferry expenditures are currently lower than the original estimate. The Browns Ferry Unit 3 budget was reduced in both FY94 and FY95 yet the unit recovery has remained on schedule.

See comment 14.

Estimate of First-Year Incremental Cost Analysis for Watts Bar I
GAO provides no basis for the assumption of a one-year delay at an expenditure level equal to the peak-modification period for the plant. This assumption does not acknowledge that modification work is essentially complete, that the NRC has conducted extensive inspections and approved large portions of the corrective action effort (10 of 27 corrective action programs are complete; the remainder are more than 75% complete), or that any further delays will likely be limited to specific areas of work.

Similarly, the assumption of a 38-percent-capacity factor does not have any basis. This assumption does not acknowledge the much-improved performance of both TVA nuclear plants and those of the entire nuclear industry as they have matured and been improved by the major backfits and upgrades required by regulation. In addition, the assumption includes 10 years of shutdown at Browns Ferry 1 and six years of shutdown at Browns Ferry 3 when TVA was making no attempt to recover the units.

See comment 15.

System Generation
"Despite having made significant improvements recently to its coal and hydroelectric units, TVA anticipates needing between $240 million and $301 million per year over the next 26 years." This statement implies that this is an unusual level of expenditure for these plants. In fact, this is approximately $15 per year per installed kilowatt, a very reasonable level for maintaining good performance levels at these power plants.

The statement that TVA will need substantial capital to meet the requirements of the Clean Air Act is true, but misleading. GAO fails to acknowledge that TVA has already completed the capital expenditures associated with compliance with Phase I of the Clean Air Act Amendments of 1990. In GAO figure 3.4, 36 percent of 1993 capital expenditures and 38 percent of 1994 expenditures covered clean-air upgrades. In addition, TVA compliance costs are reduced because of its mix of generating sources. Approximately 30 percent of current generation is from non-coal sources that are not affected by SO2/NOx reduction requirements. This percentage will further increase with the startup of Browns Ferry 3 and Watts Bar 1. Finally, low-capital alternatives for compliance with Phase II requirements are included in the IRP evaluations of the most cost-effective approaches for TVA in the future.

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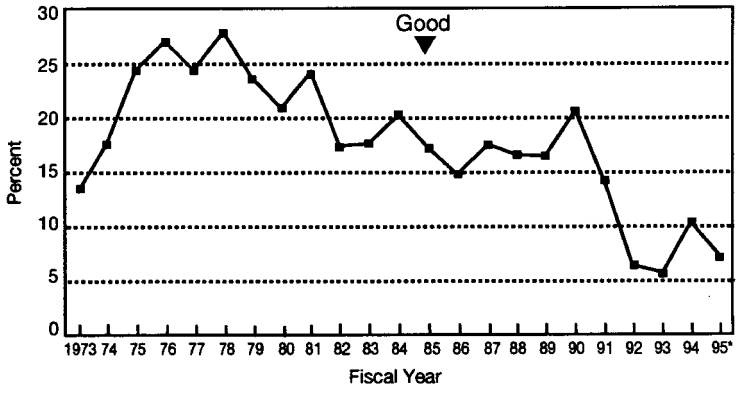
See comment 15.

Capital Expenditures for Fossil and Hydroelectric Generation
As illustrated below, the forced-outage rate on the fossil system peaked in the mid 1970s. The forced-outage rates experienced in the mid-1980s were approximately 10 percentage points lower than the mid-1970s peak, even though capital expenditure levels had dropped. Recognizing the growing demands on the TVA power system, TVA management took a number of actions in the early 1990s to improve fossil performance. These included improved outage, operating, and maintenance practices; better predictive and corrective-action programs (such as the boiler-tube-failure prevention program); and an overhaul program involving increased capital expenditures. The performance improvements in the early 1990's resulted in large part from these improvements, while the capital expenditures will help in maintaining these levels for the future.

TVA Fossil System
Equivalent Forced Outage Rate



* Fiscal year-to-date through April

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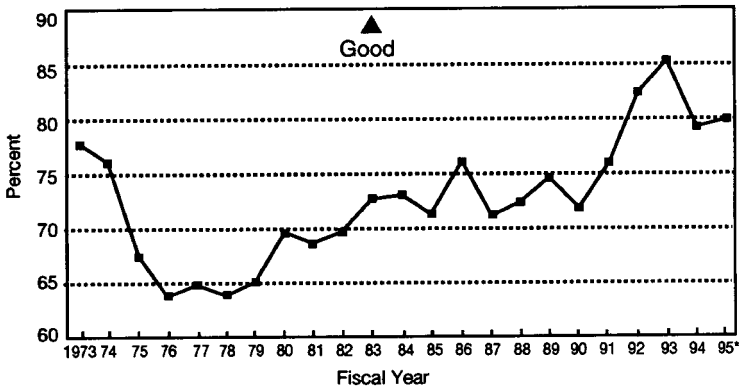
See comment 15.

Equivalent Availability Factor
TVA Coal-Fired System



* Fiscal year-to-date through April

With regard to the hydro system, TVA performance has always been at least above average and is usually excellent. While hydro performance dropped in the late 1980s, the availability was still above national averages. Based on the age of the hydro system as well as the opportunity for several hundred megawatts of low-cost capacity, TVA management determined that a modernization and upgrade program was appropriate. Although the modernization program is still in its early stages, the performance of the hydro system has already been returned to its normal excellent levels through improved maintenance and timely correction of problems.

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See comment 16.

See comment 17.

See comment 18.

CHAPTER 4—

TVA's Ability to Compete

TVA's Electric Power Distributors
GAO interviewed and met with a number of TVA's electric power distributors through the course of the review, and it notes two of TVA's distributors are actively seeking alternative suppliers. However, 158 distributors and 61 directly served industrial customers benefit from a close relationship with TVA. In a 1994 survey that included factors of price, reliability, and service, 84 percent of TVA's customers were satisfied with TVA as their supplier of electric power. And, there are a number of other electric power distributors and customers that would join TVA if permitted.

TVA is Changing to Meet New Competitive Pressures
A key issue prevalent throughout this report is that GAO does not adequately recognize the positive, self-imposed steps that TVA has taken to improve its competitive position. TVA has significantly downsized——from 34,000 employees in 1988 to 16,500 today. TVA's IRP will emphasize such flexible options as small, gas-fired plants and buying power from independent power producers. TVA has competed on a price basis—-e.g., industrial ESP and LIP rates. And TVA has written off its nuclear-fuel expense to increase production-expense competitiveness, all without raising rates.

Palmer Bellevue that found that, from a competitive standpoint, TVA's financial condition is likely to be able to withstand the pressures of a more intensive competitive market, and, overall, TVA is ready for competition. On balance, TVA's somewhat lower costs and prices will enhance TVA's financial flexibility. The major disagreement between GAO and Palmer Bellevue appears to be in the timing and aggressiveness of how TVA's debt should be reduced. As supported by strategic business consultants, TVA will realign its financial position based on development of additional resource strategies to address industry deregulation.

Regarding competition in the short-term, GAO says "The increase in load stability decreases the possible short-term impact of competition on TVA's electricity sales and revenues" (page 77). GAO is incorrect in this conclusion because actually many of TVA's industrial customers are constantly looking for better rates (short-term) to shift their production lines to other plants located outside of the TVA service territory. And as always, TVA must maintain competitive rates to continue to compete for its industrial customers. (See map on following page for illustration of regional rate comparison.)

Distributor Contract Issues
The GAO did not make use of an analysis conducted by TVA that contradicts the 4-County Electric Power Association study prepared by GDS Associates. TVA's analysis exposes the weaknesses of the GDS study, which concluded that early release of 4-County from its commitment to purchase power from TVA would result

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See comment 18.

in a net benefit for 4-County customers of $38 million. TVA's analysis shows that the requested release would result in costs to TVA's customer of $57 million to $133 million. The GDS study overstated both the capacity additions required during the period and the amount of capacity that would be avoided if TVA did not serve the load. The GDS study also did not use the lowest-cost alternatives available for capacity expansion, thus overstating the costs. Assumptions for capacity alternatives are reviewed in TVA's IRP.

TVA's electric-power contracts, as currently written, contain no specified monetary penalties if a distributor chooses to break its contract.

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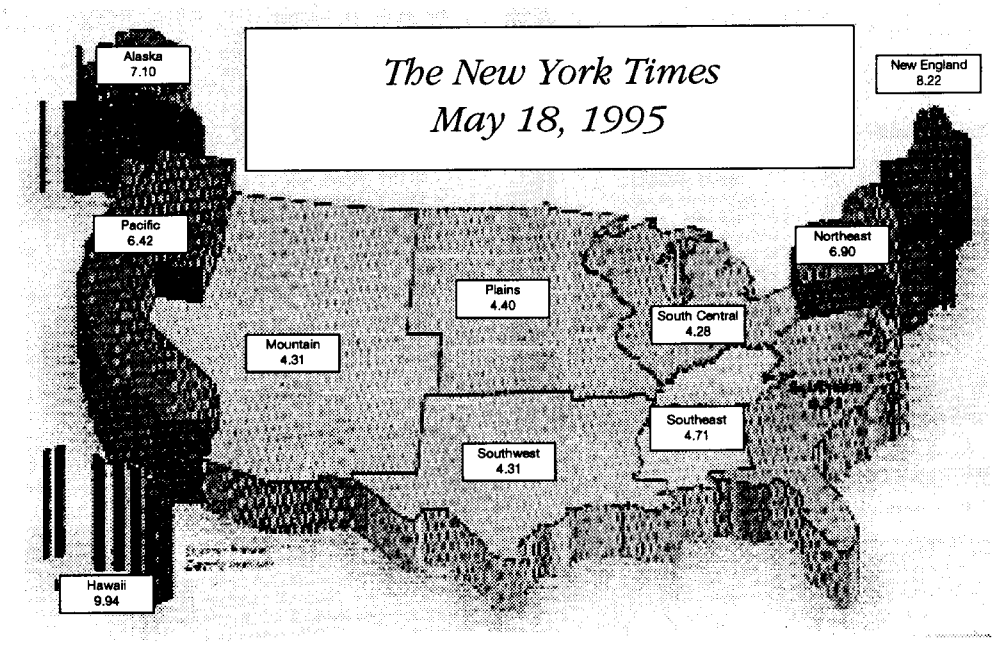

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See ch. 5.

See comment 17.

See ch. 5.

See comment 11.

See comment 19.

See ch. 5.

See comment 20.

Chapter 5—

Conclusions

Managing the Debt

While we agree that continuing attention to TVA's debt burden will be required, we strongly disagree with the "crisis" tone of the GAO report as a whole and Chapter 5 in particular. TVA's debt is large in absolute terms. But it is also true that TVA is a large corporation, with more than $5.4 billion in annual revenues. Debt is a recognized necessity for large corporations, and TVA has consistently met its very stringent bond tests.

TVA's debt and resultant financing costs do not jeopardize its ability to meet competitive challenges from neighboring utilities. When TVA's debt is compared to the overall capitalization of neighboring IOUs, it is *not* out of line with its competitors in the utility industry. As previously mentioned, TVA can finance capital projects only by issuing debt. IOUs, in addition to issuing debt, raise approximately one-half of their capital through issuing stock.

GAO asserts that "...because of the size of operating-cost savings already achieved, it is unclear whether further significant reductions are available." In fact, TVA will continue to find ways to cut operating costs and improve its efficiency. Savings achieved are clearly not a measure of savings potential in any business. TVA has indicated that to reduce the debt, TVA will reduce capital expenditures. The level of capital spending is scheduled to be reduced by $1 billion over fiscal years 1995 to 1997. The chapter notes significant capital requirements for TVA's coal and hydroelectric plants, but it does not address what drives these requirements. Where there is potential for significant improvements in efficiency or reliability, TVA naturally plans to make such capital investments. TVA must also pay for capital improvements associated with the Clean Air Act, which is legislation that affects all utilities. The GAO report implies that such capital investments are necessary simply to keep the plants running. That is not the case.

TVA is not, as asserted by the GAO report, "highly subject to interest rate fluctuations." Through the course of the GAO review, the investigators should have learned that TVA's portfolio has an average remaining life of 18 years at an average *fixed* rate of 7.3 percent. In fact, TVA's effective refinancing of its debt, carried out over the past eight years, gives it a significant competitive advantage over its neighboring utilities.

In discussing TVA's financing costs, GAO again does not make a proper comparison with other utilities. In order to make a proper comparison, interest, dividends and taxes must all be included. When this is done, TVA again compares favorably.

This chapter suggests, as an "option," that TVA "could consider a rate increase." GAO presents a scenario in which TVA could raise rates by 10%. It then notes the considerable negatives, including reduced sales and customer loss that might flow

See ch. 5.

See comment 21.

from this action. Needless to say, this would compromise TVA's competitive position in the marketplace.

GAO miscalculates when it suggests that TVA's rates would rise when its incomplete plants are amortized. The GAO assumes that these assets have no value, which does not adequately reflect the findings of the IRP process. Moreover, in comparing TVA's accounting treatment of incomplete plants, GAO misses two vital points. First, TVA includes all interest costs in current rates; IOUs, meanwhile, do not include interest associated with incomplete plants. Second, the costs to be included in rates when assets are removed from deferral status are primarily tied to depreciation. Depreciation is a non-cash expense; therefore, it does not affect cash flow, which is the most significant determinant of corporate health. TVA generates more than sufficient cash to fund its ongoing operations and its debt service.

In the course of its efforts to refinance its debt at more favorable interest rates on the public debt market, TVA gave up its access to financing through the Federal Financing Bank (FFB). As of 1993, only about $6 billion of TVA bonds were still held by the FFB. The average cost of that FFB-held debt was about nine percent, nearly two percent higher than TVA's cost of its public-market debt. As mentioned earlier, that same year TVA offered to pay off all of the remaining FFB-held debt, but the Treasury Department refused to allow TVA to do so.

Options

Increased Oversight

For almost two decades "increased oversight" has been a ready answer to perceived problems at TVA. True, TVA began an ambitious nuclear construction program 30 years ago when demand for electricity was accelerating rapidly and nuclear power looked like the technology of the future. TVA owed nothing less to its customers and to the economy of the region to ensure they had an ample supply of electric power. Most importantly, TVA was not alone. As GAO points out, utilities with strict commission oversight took similar actions.

As events changed, TVA changed. It scaled back its nuclear program, deferring and canceling nuclear units as costs rose and projected electric-power demands fell. TVA recently made the difficult decision not to complete by itself the remaining nuclear units under construction as nuclear units. This decision demonstrates the TVA Board's willingness to make responsible and tough decisions relating to both the debt and nuclear program. The correctness of this decision is borne out by TVA's newly released draft IRP.

Few private corporations operate under as much oversight as TVA. Because TVA is a public corporation, its records, meetings, and business deliberations are more open to the public than those of a private corporation. TVA's Appropriations subcommittees perform annual oversight hearings of power-program issues. TVA's jurisdictional committees in Congress have held a number of oversight hearings during the period in question and are always free to hold additional oversight hearings as they deem appropriate. TVA routinely answers to Congress on numerous issues through correspondence and inquiries each year. Moreover, the marketplace conducts the toughest oversight possible.

See comment 21.

TVA is already subject to the "external oversight" of the forces in the bond market. This is often a more effective oversight than boards or committees. The well-documented bankruptcy of Public Service of New Hampshire and the near failure of Tucson Electric Power and Pinnacle West Capital Corporation show that review by public utility commissions do not necessarily guarantee fiscal restraint. In calling for increased oversight and regulation, the GAO report misses the point of what has been happening in the electric power industry. Regulation and formal oversight by commissions and other bodies is giving way to reliance on the pressures of the marketplace to conduct the kind of oversight that really counts. Congress accelerated this dramatic shift to "customer oversight" by enacting the Energy Policy Act of 1992.

To compete effectively in this new business environment, TVA must be free to make sound business decisions in order to meet the needs of its customers.

Enlarge TVA's Board of Directors
A larger board could encourage more attention to parochial interests, while a smaller Board is more able to focus on common goals. The GAO also lists the option of a part-time Board. The chance of a part-time Board's making ill-advised decisions is even greater than with a full-time Board, since a part-time Board must necessarily rely almost exclusively on what information management provides, or does not provide.

Limiting or Restructuring TVA's Debt
GAO suggests as an option that the Federal Government forgive TVA of the $4.2 billion still owed to the U.S. Treasury. Once again, TVA has offered to pay off the debt owed to the federal government, but the Treasury denied the request. This would have been a benefit to the U.S. taxpayers and at the same time allowed TVA to reduce operating costs.

Removing Barriers to Competition
The TVA advantages the GAO mentions are not nearly as great as the GAO implies. If TVA were not tax-exempt, payments to state and local governments would be greatly reduced. TVA and distributors currently pay approximately 25 percent more in tax-equivalent payments to state and local governments than IOUs. TVA would also take advantage of opportunities in federal taxation, notably the interest-free loans through deferred taxes noted earlier.

GAO describes the growing competitiveness in the electric-utility industry, indicating that the Energy Policy Act of 1992 promoted and enhanced this competition. It notes that a restriction on FERC's new wheeling authority does not permit FERC to order TVA to wheel power supplied by private utilities into TVA's service area for sale to a TVA distributor and, thus, insulates TVA from certain competition. On one hand, GAO seems to call for the repeal of this restriction on FERC's authority. On the other hand, it is unwilling to accept removal of the "TVA fence," which prevents TVA from competing with private utilities. In short, GAO reiterates the traditional anti-TVA line of private utilities, which have long tried to avoid competing with TVA, then mistakenly asserts that TVA probably could not compete successfully.

See comment 21.

Section 15d of the TVA Act prohibits either TVA or any of its distributors from supplying power outside their service areas as they existed in 1957. Without the protective restriction on FERC's wheeling authority described by GAO, private power companies could use FERC's new wheeling authority to compete for TVA's wholesale customers while TVA would still be prevented from competing for their customers because of the "TVA fence."

Privatizing TVA
Privatizing TVA would force major changes in TVA's capital structure, resulting in increased electric rates for TVA ratepayers. There are no sound business reasons for privatization.

FERC Regulation of TVA Wholesale Rates
This suggestion simply repeats what private power companies would like to see---that is, TVA consumed with as much costly and time-consuming regulations as possible. FERC regulates the wholesale rates of private power companies and serves to keep rates low from monopolistic sources. The rates of publicly owned electric systems are not regulated by FERC.

Moreover, GAO does not explain how FERC's regulation of TVA's wholesale rates can improve TVA's financial soundness.

Regulation By A New Federal Public Utility Commission
This GAO suggestion has all the shortcomings of FERC Regulation plus it raises the question why GAO would seek to create a new federal agency in Washington, D.C., at a time when Congress is seriously proposing the elimination of entire cabinet departments.

Regional Planning Council
GAO's suggestion for establishing a regional planning council, modeled after Bonneville's Northwest Planning Council, overlooks several important facts.

First, Bonneville was created as a limited-purpose power agency, whereas TVA was created for the very purpose of developing all the resources in the Tennessee Valley region. The power to plan for that development was expressly vested in the TVA Board. TVA was given broad powers to plan and develop electricity generation for the entire region and to build the transmission lines necessary to deliver it to customers.

GAO suggests there is no state or local input involved in TVA's decision-making and policy issues. The whole TVA power system is based on a series of contracts negotiated with the 160 municipal and cooperative systems that distribute TVA electric power. And the IRP has facilitated significant public participation involving representatives of distributors, large industrial customers, environmental and public advocacy groups, and academic institutions.

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See comment 22.

Appendix I -

TVA's Integrated Resource Planning Process

GAO did not address the following issues adequately:

1. Building-block teams were discussed, but other teams not discussed include:

- Competition Team - formed to determine the nature of open-access/competition issues and how to handle competition for IRP purposes.
- Transmission Team - formed to develop an IRP problem focus and methodology for analyzing the effects of transmission- and distribution-related changes such as improvements to the T&D system, targeted DSM, and dispersed generation.
- Scoping Team - formed to provide a knowledgeable, broad-based assessment of the IRP/EIS issues and ensure that the presentation of the results achieve the objectives of the IRP and meet the requirements for an EIS.
- Study Team - formed to provide guidance and peer review of all information developed by building-block teams.

2. GAO does not adequately describe the significant advantages of the interactive planning approach, known as multi-attribute trade-off analysis, used by TVA. That approach requires:

- Identifying public issues and relevant concerns.
- Translating public issues and concerns into evaluation criteria, resource options, and uncertainties.
- Crafting resource options into strategies.
- Identifying possible future conditions (uncertainties).
- Using trade-off analysis to determine the best strategies for the future.

Value judgments about the importance of potential impacts from various resource options (e.g., on cost, rates, environment, TVA's debt) are intentionally deferred until later in the process, when extensive discussions take place weighing trade-offs on these important issues.

3. GAO fails to discuss TVA's use of best practices used by leading utilities around the country in preparing integrated resource plans. These best practices include:

- Identifying a broad range of supply-side and customer service options and their unique operating characteristics.
- Using multiple evaluation criteria that include total cost and rate impacts, environmental impacts, and risk management to compare specific resource plans or strategies. This includes the addition of a measure of economic value, which broadens the range of options considered in the plan.
- Integrating multiple perspectives through a variety of public-participation techniques.
- Incorporating uncertainties into the planning process.

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See comment 23.

Appendix II —

Review of TVA's Load Forecasting

TVA's Forecasting Methodology Is Generally Reasonable
In this section GAO admits that, compared to information available in the utility industry, TVA's forecasting has been generally reasonable and not out of line with utility norms. In fact, TVA methodology is state-of-the-art, and the corporation continually strives to maintain this via participation in user groups and membership on the EPRI forecasting board.

Regional Economic-Growth Assumptions
"In comparison, growth projections made by DRI for the East-South Central region of U.S., are less optimistic." DRI has been revising their estimates for Tennessee upwards and Tennessee comprises the bulk of our service territory. There are other forecasts which agree with TVA---notably that of University of Tennessee at Knoxville, which serves as the official forecast for state of Tennessee.

Appendix V —

TVA's Use of In-substance Defeasance of Debt As A Refinancing Tool

TVA agrees with GAO's conclusion that defeased debt has been properly accounted for and should not count toward TVA $30 billion statutory debt limit. TVA's Office of the General Counsel and Mudge Rose Guthrie Alexander & Ferdon, legal counsel for underwriters of TVA bonds, have also issued legal opinions that defeased debt does not count toward TVA $30 billion statutory debt.

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Palmer Bellevue
A Division of Coopers & Lybrand L.L.P.

June 13, 1995

Mr. Alan R. Caron
Senior Vice President, Strategic Planning
Tennessee Valley Authority
400 West Summit Hill Drive, ET6D
Knoxville, Tennessee 37902-1499

Dear Alan:

Attached is a copy of Palmer Bellevue's comments on GAO's draft report entitled Tennessee Valley Authority: Financial Problems Raise Questions About Long-term Viability. We appreciate the opportunity to submit these brief comments and hope they help advance the open dialogue about how TVA and Congress should respond to an increasingly competitive electric marketplace.

Please feel free to call me if you have any questions regarding our comments. We would be happy to elaborate further on any points of particular interest to either TVA or GAO.

Sincerely,

Erik B. Jacobson
Manager

111 W. Washington St. Suite 1247 Chicago, IL 60602
312/807-4848 312/807-4992 FAX

See ch. 5.

Comments of Palmer Bellevue on

GAO Report

Palmer Bellevue supports GAO's stated intent of starting a dialogue among key decision makers concerning TVA and its position in an increasingly competitive electric market. While we do not share GAO's pessimistic picture of TVA's competitive position and financial situation, there is no doubt that TVA and other electric utilities across the country face a multitude of challenges to prepare for the new realities of electric industry competition. The fundamental question raised by the GAO Report is how Congress should respond to these new realities. In this regard, Palmer Bellevue continues to recommend that the "Fence" be removed to provide TVA with freedom to compete effectively and to instill the discipline of the market on TVA to make it more competitive.

The GAO Report provides some useful information about TVA but gives short shrift to some rather important aspects of TVA's situation and competitive position. The draft Report also fails to properly assess the various options recommended to Congress for its consideration. Palmer Bellevue's comments are largely limited to two areas of the Report which bear most directly on issues addressed in our study, The Ties That Bind: TVA in a Competitive Electric Market. These two areas are (1) the competitive value of TVA's relatively lower direct costs of power production compared to many other producers in the region, and (2) the efficacy of removing the "Fence" as a means of encouraging and permitting TVA to more fully reflect in its operations the increasingly competitive nature of the electric market. In addition, we comment on certain points which we believe GAO presents in ways which are not as complete as they should be.

See comment 24.

Production Costs

The GAO Report focuses almost exclusively on the size of TVA's debt as a measure of its fixed costs to conclude that TVA would likely be unable to compete with its neighboring utilities in a competitive market. This conclusion appears to ignore consideration of TVA's cost of producing electricity which is one of the most important factors affecting a utility's ability to compete. A review of TVA's cost of generating electricity in comparison to its neighboring utilities reveals that on this score TVA is in a relatively strong position.

The April 1995 report by Palmer Bellevue presents a comprehensive assessment of TVA's competitive position in generation. Two of the more important measures of this position are TVA's incremental and average cost of production relative to other IOUs in the region. The Palmer Bellevue report shows that TVA's incremental cost of producing electricity (measured by

the "system lambda"), is exactly equal to the average of the incremental production cost of 15 neighboring IOUs in the region. This means that TVA's actual "out-of-pocket" cost of producing an increment of electricity is virtually the same as the average of IOUs in the area. This starting place should provide TVA a reasonable opportunity to collect its fixed costs under a competitive market structure.

On an average cost of production basis, TVA's competitive position is even better. TVA's average production cost of 1.54 cents per kWh during 1993 was significantly below the average of 2.02 cents per kWh for the group of 15 neighboring IOUs. In fact, 13 out of the 15 IOUs examined in the Palmer Bellevue report had higher average production costs than TVA. This competitive advantage can significantly offset any of the competitive disadvantages that TVA has with respect to financial flexibility.

The existence of non-operational nuclear assets does not change the reality that TVA has relatively low production costs compared to its neighbors. Low production costs will help TVA recoup the sunk costs of its deferred nuclear assets. In addition, the economical completion or recovery of Watts Bar 1 and Browns Ferry 3 as scheduled will have the benefit of adding capacity with low operating costs to the TVA system.

Another important factor that should be recognized is that TVA's relatively large size in the regional electric market provides it with some competitive advantages. Many of TVA's neighboring IOUs with lower costs (e.g. Kentucky Utilities and Louisville Gas & Electric) are in fact relatively small. While these utilities could represent real competitive challenges for TVA in an open market, the inroads that they might be able to make against TVA would be relatively small simply by virtue of their small size and lack of surplus marketable capacity. GAO touches on this proportionality issue but does not explore its implications.

See comment 25.

Taking Down the Fence

There is a genuine inconsistency in the GAO Report on the question of removing the "Fence." On pages 72-74, the GAO Report reasonably describes some of the basic findings of our April 1995 study and the policy recommendation for a two phase taking down of the "Fence." GAO takes issue with our dual contentions that TVA is competitively situated in the "middle of the pack" as the electric markets begin to actively open up for competition and that the "Fence" should be removed as a way of reconciling TVA's practices and conditions with emerging market realities. GAO's disagreement with our study is not well supported by its own analysis.

First, with respect to competitive position, the GAO Report, as explained above, largely

ignores the matter of production costs, an absolutely critical dimension of competitiveness in an open electric market. Our contention is that TVA's relatively low costs in this area help to offset the fact that it has somewhat less financial flexibility compared to its neighbors. This omission tends to undermine GAO's rather acute pessimism about TVA's long term competitiveness. A more complete analysis of TVA's competitive position yields a more encouraging picture of its competitive capability.

Second, on page 74 GAO expresses disagreement that "taking away the 'fence' will make TVA more competitive." Yet, GAO concludes on page 90 that "Removing the 'fence' and exposing TVA to competition would be consistent with competitive and less regulated markets. TVA would have to operate with increased discipline in response to competition and other market forces." GAO should have a more internally consistent set of findings and conclusions in its Report.

A close review of the five policy options discussed by GAO in Chapter 5 increases the difficulty in understanding GAO's position relative to the "Fence." GAO's discussion of policy options would suggest that its third policy option, "Removing Statutory Barriers to Competition," would have the least adverse impact on the federal government. While GAO may be concerned that TVA's fixed costs make success in a competitive market difficult over the long term, GAO is correct -- in its concluding chapter -- that real competition will make TVA more rather than less competitive. An objective reading of the GAO Report leads to the inference that, all things considered, the gradual and thoughtful removal of the "Fence" represents the most obvious and efficacious route for bringing TVA in the direction GAO regards as desirable.

See comment 21.

Other Comments

GAO's fifth suggested policy option of creating some new or additional form of oversight is not especially well-grounded. First, it should be understood by readers of the GAO Report that the reference to the "regulation" of Bonneville Power Administration (BPA) rates by the Federal Energy Regulatory Commission (FERC) as a possible model to apply to TVA is considerably overstated. The simple truth of the matter is that FERC's rate regulatory role relative to BPA has largely been that of a rubber stamp for rates which BPA sets according to the process elsewhere described in the GAO Report. There is nothing in the FERC/BPA relationship that is remotely like the "detailed level of regulatory oversight of TVA" suggested by GAO Option 5.

Second, it is questionable whether additional regulatory oversight would have addressed GAO's concerns. GAO suggests on page 86 that "it is doubtful that a public utility commission would have allowed TVA to indefinitely defer from rates billions of dollars of construction costs."

See comment 26.

This description of the approach of state regulation to the reflection of the capital costs (including interest payments) of unfinished or even abandoned plant is overstated. State regulators are not typically aggressive in forcing utilities to immediately reflect these capital and interest costs in rates. The treatment of such costs also varies dramatically between states. For instance, in a number of the states where TVA's key competitors operate (Arkansas, Georgia, Illinois, and Missouri) there are prohibitions or restrictions on reflection of Construction Work in Progress (CWIP) in rates. These restrictions generally involve the exclusion of interest payments on debt which would be proportionally related to CWIP and capitalized as part of the eventual end-cost of the plant. TVA reflects its interest payments on all debt on a current basis in rates (this includes interest on capital outlays for TVA's deferred nuclear assets). It is also the case that most state utility regulators permit and have even imposed deferred treatment for many costs. TVA's neighboring investor-owned utilities have billions of dollars of such deferred costs. While GAO's criticism of TVA's use of deferred costs of construction may have merit, that merit must be based on something other than an appeal to a vision of state utility regulation that is unrealistic.

In any event, as acknowledged by GAO, additional government oversight runs counter to the evolution of the industry towards increasing competition. Now is not the time to consider adding another layer of government bureaucracy to review TVA's operations and decisions. It would be far better to remove the statutory barriers to competition as described in GAO's third policy option. This option is consistent with the competitive realities facing TVA and will, more than any other option, lead TVA in the direction that GAO regards as desirable.

The following are GAO's comments on TVA's letter dated June 15, 1995.

1. We agree with TVA that differences exist between the amounts and types of regulation faced by publicly-owned and cooperative utilities and private ones (i.e., IOUs). However, we disagree with TVA's view that (1) publicly-owned and cooperative utilities receive almost no oversight from public utility commissions and (2) TVA does not need regulatory oversight because it is publicly owned. Regarding the first point, TVA pointed out that publicly-owned utilities are overseen by municipal or independent boards, or boards comprised of customer-owners. Moreover, according to a 1992 study by the National Association of Regulatory Utility Commissioners, 21 states (out of 46 with rural electric cooperatives) regulate the rates of those cooperatives. TVA does not receive these types of scrutiny. Regarding the second point, TVA's decisions to invest billions of dollars in nonproducing assets over an extended time period using debt financing may indicate that TVA merits special regulatory attention in order to better safeguard the interests of both TVA's ratepayers and the federal government.

2. As stated in appendix III, we did not review the effectiveness of TVA's IRP process in appendix I because it is subject to change and the final IRP was not scheduled to be completed until December 1995. We reviewed the preliminary draft of TVA's IRP, presented to the IRP Review Group on May 31, 1995, and concluded that the information it contains provides further support for some of the major conclusions in our report. For example, on the basis of the potential recommendations in TVA's preliminary draft, key TVA decisions about the future of Watts Bar 2 would continue to be deferred until the year 2000 and TVA would also study for 18 to 24 months a potential option to convert the two Bellefonte units to another fuel source. As a result of this information, we conclude in chapter 5 that it is no longer reasonable for TVA to defer the $6.2 billion of costs related to these units from current revenue requirements. Moreover, it proposed plans that the Board may or may not act upon in the future. We have updated the information included in appendix I to recognize that the preliminary draft was provided to the IRP Review Group on May 31, 1995, and TVA issued a draft IRP plan to the public at the end of July 1995.

3. We show in our report how TVA's residential, commercial, and industrial rates compare with the nine IOUs. We note that TVA's rates, while low, are not the lowest compared to neighboring utilities. TVA states that its low operation and maintenance costs will be a crucial factor in future rates. We continue to believe that TVA's enormous financing costs and deferred

assets are the key to the competitiveness of TVA's future rates. Inclusion of deferred assets in TVA's revenue requirements will put significant pressure on TVA to raise its rates in the future.

TVA states that the interest component of deferred assets is included for TVA but that IOUs have not included these costs in current rates. TVA has not capitalized interest related to the Watts Bar 1 and Bellefonte plants since 1990. However, of TVA's $14 billion in deferred assets at September 30, 1994, over $5 billion represents interest capitalized during the lengthy construction of these assets, which is excluded from current rates. In addition, we compared TVA's current capitalization of interest to similar capitalized costs of the neighboring IOUs and found that, for fiscal year 1994, TVA capitalized $123 million of interest, whereas similar capitalized costs for the 9 IOUs ranged from $0 to $112 million, with 8 of the 9 IOUs having $29 million or less. Thus, in addition to the $5 billion of capitalized interest related to deferred assets, TVA is currently deferring more interest expense from current rates than neighboring IOUs.

4. We have revised our report to reflect that at the end of fiscal year 1994, TVA's appropriated debt was $390 million. This amount represents the $1 billion repayment required by law less the $610 million repaid at September 30, 1994. We consider the balance to be repaid as appropriated debt because TVA must repay this amount to the Treasury with interest and, therefore, it has the same effect on TVA as any other debt obligation.

5. Based on additional information provided by TVA, we have revised our report to reflect that TVA's outstanding line of credit as of September 30, 1994, was $126 million.

TVA stated that our definition of capitalization in footnote 7 was in error because it did not include current taxes payable, deferred taxes payable, and deferred investment-tax credits for IOUs. We disagree with TVA's definition of capitalization. Industry practice as indicated by all nine of the IOU annual reports we reviewed does not include these items in capitalization. Further, TVA's inclusion of these items in capitalization is inconsistent with the Palmer Bellevue study, which does not include deferred taxes payable in capitalization for IOUs.

6. We agree that TVA is subject to congressional and Office of Management and Budget review.

7. Book value represents the costs of assets that must be included in TVA's future revenue requirements. The primary purpose of our analysis was to show that inclusion of TVA's nonproducing assets in revenue requirements will put pressure on TVA to raise its rates. A market value analysis of TVA's assets is not relevant to revenue requirements.

8. We agree that short-term stock prices would be negatively impacted by an IOU's decision not to pay dividends. However, IOUs have this flexibility and some have elected this option in the past.

9. As reflected in the table in TVA's comments and table 2.3 of our report, TVA and American Electric Power have about the same amount of system capacity. We also state in our report that TVA had net total assets that were double those of American Electric Power. The major purpose of our comparison between TVA and American Electric Power was to show that primarily because of its investment in nonproducing assets, TVA had almost twice the investment in assets in 1994 as American Electric Power, yet TVA produced approximately the same amount of power and revenues from its operations. Our analysis also highlights that TVA has far more total net assets than American Electric Power—costs that TVA will have to recover in future revenue requirements. We have added a footnote to table 2.3 to reflect that nearly $8 billion of TVA's deferred assets are associated with Watts Bar 1 and Browns Ferry 3 and that TVA's capacity would increase by about 2,230 MW if these units become operational.

10. We agree that Kentucky Utilities has lower rates than TVA and relatively tight capacity margins. However, TVA is incorrect in saying that because Kentucky Utilities has not built new capacity, it cannot market power in competition with TVA. As stated in our report, a Kentucky Utilities official said that the utility has sufficient existing capacity to compete for some of TVA's smaller customers, generally those with loads of 100 MW or less. TVA's comments do not acknowledge that other low-cost utilities in the region, such as American Electric Power, have surplus capacity and, therefore, would be able to compete for some of TVA's larger customers. In addition, TVA does not acknowledge the threat of competition from IPP's. Several companies have recently developed natural-gas fired generating units that are 50 percent more efficient than earlier units and require minimal capital investment. IPP's typically use such new technologies to generate electricity, which places downward pressure on electricity rates.

The comparison of investment in PP&E per MW of generating capacity to rates was used to illustrate the general relationship between these two

items. The fact that this relationship does not hold true for each utility does not diminish its general validity. The chart shows that because of TVA's comparatively large investment in PP&E, its rates are likely to increase in the future when it begins to recognize the costs of its deferred assets in its revenue requirements.

11. In chapter 3, we show the cost overruns and schedule slippage TVA has experienced in its nuclear program and also recognize that TVA faces the need for a substantial investment in its aging coal and hydroelectric plants. We further recognize that TVA anticipates spending hundreds of millions of dollars annually for the next 26 years to upgrade these plants. We concluded that further delays in completing the construction of its nuclear plants could limit capital funds available for needed improvements to coal and hydroelectric plants, especially if TVA honors its commitment to maintain its debt at below $28 billion. Our report recognizes TVA's efforts, beginning in 1991, to initiate a capital improvement program for its coal and hydroelectric plants and TVA's future significant funding plans through the year 2020. TVA's comments do not mention that Watts Bar 1 is again delayed from December 1995 to February 1996 and has exceeded its latest budget targets.

TVA states that our analysis of first-year operating costs for nuclear units is "incorrect" and leads to "erroneous conclusions" about expected costs. TVA further states that a panel of experts independent of TVA performed a thorough analysis of TVA's nuclear assumptions used in the IRP and has not indicated any potential conflicts. We reviewed the analysis done by the panel of experts in February 1995 and found that there was no analysis of TVA's estimated cost to complete Watts Bar 1 and Browns Ferry 3. As our analysis in chapter 3 shows, cost to complete these units is one of the two most significant factors in determining future incremental costs. Since fiscal year 1990, Watts Bar 1 and Browns Ferry 3 have had cost overruns of over $2.7 billion. On the basis of TVA's fiscal year 1994 expenditures, TVA's further schedule slippage for Watts Bar 1's commercial operation date from October 1995 to February 1996 will result in an additional cost overrun of about $130 million. We continue to believe that the cost of completing these two units may be higher than TVA anticipated.

12. Our report was not intended to imply that TVA was continuing to maintain that Watts Bar 1 qualifies for an operating license. We have clarified this point in our report. In addition, we have updated our report to show TVA's latest schedule change and NRC's views of TVA's recent performance at Watts Bar 1. In its comments, TVA referred to 27 major

corrective action programs, but NRC lists 28 programs. We used NRC's number in our report.

13. Our report states that Browns Ferry 3's construction activities have been on schedule for over a year.

14. Our report states that an assumption of one additional year's delay in the estimated date of commercial operation for Watts Bar 1 would not be inconsistent with its long construction history. Watts Bar 1 has been under construction for over 22 years and since 1990 the estimated date of commercial operation has slipped by nearly 4 years. As discussed under comment 11, the commercial operation date for Watts Bar 1 was recently delayed again. To provide a reasonable basis for estimating the range of possible cost increases, our report calculates the cost of a delay based on the average amount TVA spent per day during fiscal year 1994 at the unit, $1.1 million.

Our analysis used capacity factors of both 66 percent and 38 percent to demonstrate the sensitivity of TVA's estimate for Watts Bar 1's first year incremental cost to this factor and provide a range of possible outcomes. The 66 percent capacity factor acknowledges the recently improved performance of TVA's nuclear program. The 38 percent capacity factor is based on the combined average capacity factor for TVA's 5 licensed nuclear units since their original start-up. This lower assumption is used to illustrate what could happen to first year incremental costs if TVA incurred significant problems after bringing the unit into commercial operation. For example, for the 3 years ending in 1994, the average capacity factor for 2 of TVA's 3 operating nuclear units—Sequoyah 1 and 2—was about 50 percent.

15. In discussing TVA's coal and hydroelectric programs, we recognize TVA's past performance, the capital improvement program initiated in 1991, and TVA's plans for spending billions of dollars during the next 26 years. Our report also states that TVA has met Phase 1 requirements, and we acknowledge that, according to TVA, the availability of coal and hydroelectric units to produce power has improved, unexpected forced outages have declined, and the cost of producing power has decreased. We do not state in the report that TVA's capital expenditures for its coal and hydroelectric plants are unusual, but rather that these costs are substantial. This is especially true given TVA's limited remaining borrowing authority and its history of delays and cost overruns at Watts Bar 1 and Browns Ferry 3.

16. Although some distributors praised TVA's rate freeze, several distributors we contacted voiced concerns about TVA's debt and potential rate increases. Most of the distributors we contacted, including some of TVA's largest ones, stated they would like to satisfy at least partial requirements from outside sources. Most TVA distributors we contacted said that TVA's contracts, which self-renew automatically every year and contain 10-year advance notice cancellation requirements, are too stringent, and deny distributors the source flexibility needed to function in a competitive environment.

17. TVA's comments inaccurately indicate that our report does not recognize the positive steps taken by TVA. We disagree that the extent of these changes will make TVA a successful competitor in the new marketplace. According to financial analysts, utilities with large deferred regulatory assets and high fixed costs related to prior investments will be at greater financial risk than other utilities.

The statement in our report concerning industrial load refers to a gain in TVA's load stability due to the departure of some of TVA's industrial load during the 1980s. We agree, as stated in our report, that industrial customers are always looking for better rates.

18. We take no position regarding the validity of the study by GDS Associates or TVA's analysis of this study. Our discussion is strictly descriptive, showing that a TVA distributor is actively seeking to buy power from sources other than TVA.

We do however disagree with TVA's comment concerning monetary damages in its electric power contracts. If a distributor cancels its power contract with TVA, provisions in the contracts would require a distributor to pay for a "minimum bill amount," a percentage of the capacity specified in the contract.

19. According to TVA's fiscal year 1994 financial statements, about $3.3 billion of TVA's debt was short-term debt with less than a 1-year term to maturity, and about $5.1 billion was long-term debt maturing between fiscal year 1996 and fiscal year 1998. Our report illustrates TVA's interest rate risk by stating that if the interest rates at which TVA must refinance its approximately $8.4 billion in debt maturing by 1998 increase by 1 percent, TVA's annual financing costs will increase by about $84 million.

20. We believe because of TVA's substantial debt and resultant financing costs, it is doubtful that TVA will be able to successfully compete in the long run. As a result, we discuss a number of options available to TVA, including a rate increase, that could help to reduce its debt and financing cost and highlight issues for consideration in analyzing these options. TVA's comments correctly recognize that if TVA raised its electricity rates, certain issues would need to be considered, including the impact a rate increase might have on TVA's competitive position. However, we estimate that even a 10 percent rate increase would leave TVA with $23 billion of outstanding debt and significant financing costs after 10 years.

21. In chapter 5, we state that resolving TVA's financial problems will be costly and require painful decisions. We believe it is unlikely that TVA can solve its problems on its own and that some form of federal government intervention may be required. The options we present for the Congress to consider include a "no action" option, limiting or restructuring TVA's debt, removing statutory barriers to competition, privatizing TVA, and/or increasing oversight of TVA's activities. There may well be other alternatives. TVA raises objections to all options presented except the "no action" option. Resolving TVA's financial situation likely will require a combination of actions. We did not intend to present a particular solution to TVA's dilemma; rather, we wanted to stimulate a dialogue among the key decisionmakers concerning options available to protect the government's interests and help TVA fulfill its announced intention of becoming a competitive and financially viable utility.

TVA states that it "has offered to pay off the debt owed to the federal government" which "would have been a benefit to the U.S. taxpayer and at the same time allowed TVA to reduce operating costs." Most of TVA's federal debt is owed to the Federal Financing Bank (FFB) and has no call provisions. We agree that allowing TVA to refinance its FFB debt by issuing its own bonds would reduce TVA's interest expense since most of this debt is currently at a higher interest rate than recent issuances of TVA bonds. However, TVA is incorrect in assuming this refinancing transaction would benefit the U.S. taxpayer. TVA's FFB debt had interest rates ranging from 7.3 percent to 11.7 percent at September 30, 1994, while Treasury Bill yields for the week ended July 28, 1995, ranged from 5.7 percent for 1 year to 6.9 percent for 30 years. Thus, without a substantial refinancing premium paid by TVA, this transaction would result in a greater decrease in interest income than the decrease in interest expense for the federal government.

TVA states that "TVA and distributors currently pay approximately 25 percent more in tax-equivalent payments to state and local governments than IOUs." Determining whether this statement is true was beyond the scope of our review; however, we did find that TVA paid no federal income tax and on the average, the IOUs paid more than twice as much in total taxes as TVA.

22. As shown under comment 2, in appendix I we did not review the effectiveness of TVA's IRP process. Because TVA's "preliminary draft" of the IRP proposes that TVA continue to defer key decisions about Watts Bar 2 and the two Bellefonte units and because the preliminary draft will not be acted upon by the Board until January 1996, information contained therein provided further support for some of the major conclusions of this report.

23. While it is true that DRI has revised its growth estimate for the region upward since its 1994 forecast (ranked ninth or last among the nine regions; it was moved to seventh in their latest forecast), DRI's projected growth for the East-South Central region is still less than the national average and less optimistic than TVA's projected growth for the power service area.

24. Overall, we believe that the Palmer Bellevue study is incomplete and presents an optimistic view of TVA's competitiveness because its calculation of TVA's incremental and average cost of producing electricity excludes TVA's $1.9 billion of annual interest expense and TVA's other fixed costs, such as depreciation expense. We believe that the full cost of producing electricity is more relevant to a utility's current and future competitiveness. A utility cannot sell electricity at incremental costs (or average costs as calculated by Palmer Bellevue) for too long and remain financially viable.

25. We disagree that our report is inconsistent. Taking down the "fence" and opening TVA up to competition is a complicated matter. While subjecting TVA to competition would force it to operate in a more businesslike manner, our report states that TVA's substantial financing costs and deferred assets make it unlikely that it can compete successfully with neighboring IOUs in the long term. In order for TVA to compete effectively, costly and painful decisions need to be made.

26. To clarify our position, we doubt that if TVA were subject to a public utility commission whether it would have been allowed to incur $14 billion for nonproducing assets over a 20-year period. Our report does not assert

that state regulators force utilities to immediately begin reflecting capital and interest costs associated with unfinished or abandoned plants in their rates. Rather, our report states that utilities are "quickly absorbing into rates or writing off costs associated with uneconomical plants."

TVA's Use of In-substance Defeasance of Debt as a Refinancing Tool

As part of our review, we analyzed whether defeased debt should be included as part of overall debt for purposes of determining whether TVA had exceeded its statutory $30 billion debt limit. This appendix describes TVA's use of in-substance defeasance of debt as a refinancing mechanism. We also discuss the accounting, budgetary, and financial implications of these transactions and assess the reasonableness of TVA's position that defeased debt should not be included in the $30 billion debt limit. We briefed the requesters' staff on our analysis of the in-substance defeasance issues during September and December 1994 meetings.

Description of In-substance Defeasance of Debt

As interest rates began to fall in recent years, TVA has looked for ways to lower interest expense on existing debt. Beginning in 1989, TVA began refinancing high interest rate bonds by using in-substance defeasance arrangements. An in-substance defeasance of debt occurs when the borrower creates a trust with an independent trustee and irrevocably funds it with essentially risk-free monetary assets so that the cash flow from the trust assets is sufficient to service the outstanding debt. Specifically, TVA issues new debt and the proceeds are used to purchase investments (direct obligations of the U.S. government) that are sufficient to service the original debt including interest payments. The investments purchased from the proceeds of the new debt are placed into an irrevocable trust. This arrangement results in retiring the original debt and refinancing it with new debt at a lower interest rate.

Financial Implications

TVA has used in-substance defeasance of debt primarily to refinance its Federal Financing Bank (FFB) debt at lower interest rates. Since 1989, $12 billion of debt has been refinanced through defeasance, with $7.5 billion of this debt being FFB debt issued between 1980 and 1984 at interest rates ranging from 10.4 percent to 14.9 percent.

As of September 30, 1994, there were three outstanding bond issues totalling approximately $3.8 billion that had been defeased. The first two issues, totalling approximately $2.6 billion, matured on October 1, 1994. The third issue, totalling approximately $1.2 billion, will mature on November 15, 1996.

To illustrate the impact of these refinancing transactions, we will use the $1.2 billion debt issue. In this example, an in-substance defeasance arrangement was used to refinance the $1.2 billion of debt which has an interest rate of 8.25 percent. The new bonds that were issued to generate

sufficient proceeds to defease the $1.2 billion issue had maturities of 3 and 50 years and interest rates of 4.6 percent and 6.9 percent, respectively.

Accounting Treatment

TVA's in-substance defeasance of debt transactions are being accounted for in accordance with Statement of Financial Accounting Standards No. 76 (SFAS 76), Extinguishment of Debt. Debt that is treated in accordance with circumstances established by SFAS 76 is considered extinguished for financial reporting purposes and is removed from the balance sheet. TVA's in-substance defeasance transactions previously described clearly fall within the circumstances described in SFAS 76. TVA's use of direct obligations of the U.S. government as trust assets satisfies the funding requirements of SFAS 76. Coopers and Lybrand L.L.P. TVA's independent auditor, has reviewed these transactions and concurred with TVA's treatment for financial reporting purposes.

Budgetary Implications

As previously mentioned, TVA's electricity operations are included in the overall federal budget. TVA's $26 billion of debt at September 30, 1994, has been included in previous years' calculations of the budget deficit. We found that defeased debt has no impact on the federal budget. Proceeds from new borrowing are not considered budgetary receipts, and cash used to defease outstanding debt is not considered a budgetary outlay.

Assessment of TVA's Treatment of Defeased Debt

Under each of TVA's in-substance defeasance arrangements, the irrevocable trust agreement requires the deposit of the proceeds of the sale of new power bonds with an independent trustee. Under the trust arrangements, the payment of the defeased bonds becomes the responsibility of the trustee; it is accomplished without further action by TVA. From TVA's standpoint, therefore, the defeased bonds were paid when it entered into the irrevocable trust, and the proceeds of the new bonds were placed under the control of the independent bond trustee. We believe that TVA has a reasonable basis for its conclusion.

TVA states that the majority view taken by state courts has been that the issuance of debt, where the proceeds of which are used to refund outstanding debt, does not result in an increase of outstanding debt for the purpose of state statutory or constitutional limitations.

Major Contributors to This Report

Accounting and Information Management Division, Washington, DC	Gregory D. Kutz, Assistant Director Donald R. Neff, Senior Audit Manager Caryn Catignani, Auditor Glenn A. Thomas, Financial Analyst
Resources, Community, and Economic Development Division, Washington, DC	Bernice Steinhardt, Associate Director Ernie Hazera, Deputy Project Manager Mehrzad Nadji, Assistant Director - Economic Analysis Group Timothy J. Guinane, Senior Economist Michael F. Duffy, Senior Evaluator Cassandra Joseph, Senior Evaluator
Office of the General Counsel, Washington, DC	Thomas H. Armstrong, Assistant General Counsel Doreen S. Feldman, Assistant General Counsel Jackie Goff, Senior Attorney Amy M. Shimamura, Senior Attorney
Atlanta Regional Office	John P. Hunt, Jr., Project Manager Martha C. Vawter, Site Senior Suzanne Murphy, Auditor Philip Amon, Evaluator Stacey E. Keisling, Evaluator Pamela A. Scott, Reports Analyst

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