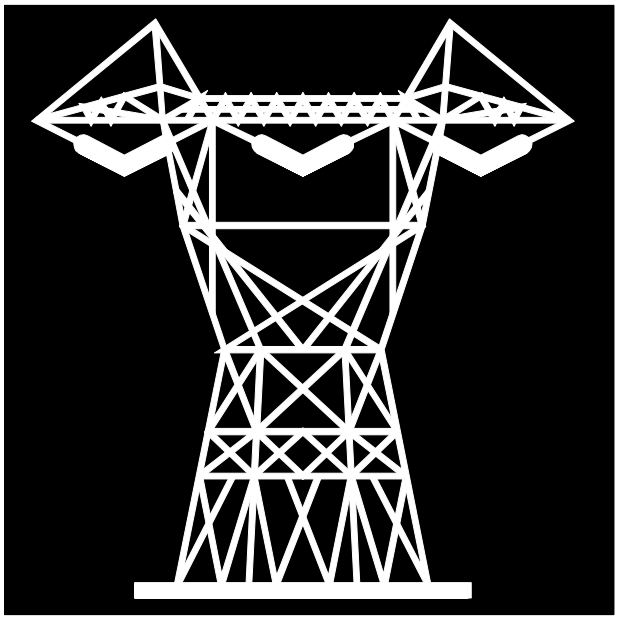
The Potential Impacts of Electric Industry Restructuring in Tennessee



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Executive Summary

Through the 1998 appropriations bill, the Joint Study Committee on Electric Utility Deregulation requested that the Comptroller of the Treasury undertake a study of whether electric industry restructuring may be beneficial to Tennessee. Office of Research staff sought to determine whether Tennessee should be preparing for a transition to retail electric competition, and, if so, what legislative and regulatory actions may be necessary to prepare for that transition.

The transition to a competitive retail electric industry requires deregulation of electric generation, restructuring tax and regulatory systems, and a host of other public policy decisions on the part of legislators and regulators. The existing tax system, methods of asset and property valuation, and differences in prices among states and regions are all based on features of an integrated electric industry consisting of public or regulated, private monopolies. These and other aspects of the industry will change with competition.

Adequately addressing the potential for retail competition in Tennessee requires explanations to a complex set of economic, political, and social issues. These include: electricity prices, accessibility to and reliability of service, industry debt and stranded costs, taxation, regulation, and public health and environmental impacts. Each of these issues is addressed in this report. Because the Tennessee Valley Authority (TVA), a federal government corporation, nearly has a total monopoly on electricity supply in Tennessee, any answer to whether retail competition will benefit Tennessee depends on the federal government's future, but thus far uncertain, actions with respect to TVA. As much as possible, this report addresses the position of TVA relative to its potential competitors as well as that agency's strengths and weaknesses that may eventually influence Tennessee's restructuring decisions and subsequent benefits.

Summary of Analysis and Conclusions

The report concludes:

Industry restructuring is a national trend, and Tennessee should prepare to be part of that trend. Taking no preparatory measures – and ultimately remaining a noncompeting island in a sea of competitive states – is likely to hurt electricity consumers, providers, and state and local governments. Depending on what legislation the Congress passes, what occurs in other states, and what manifestation of competition Tennessee chooses, changes may be necessary in taxation, regulation, public education, environmental protection, and other areas. (See page 9.)

Electricity Rates in a Restructured Market

The geographic variation in and the many factors affecting electricity bills make estimates of the effects of deregulation in Tennessee complex and uncertain. Geographic variation in prices among states is considerable, and there are differences within the Southeast region and within the TVA service area as well. (See pages 9-27.) The following will likely affect electricity charges and potential rate changes under competition:

- *Production costs* – Fuel, technology, and labor costs account for the biggest share of prices, usually between 60 and 80 percent. Recent technological developments and lower cost fuels should affect overall prices. TVA's power sources are about 61 percent coal, 12 percent hydroelectric, and 27 percent nuclear. This is significantly greater than the nuclear or hydroelectric reliance of the rest of the United States, on average, and these two sources generally have the lowest marginal production costs. (See pages 21-23.)

- *Concentrations of consumer classes* – Wholesale power costs vary little among TVA distributors, but these variations illustrate how, under the current system, higher concentrations of industrial and commercial customers in a distributor's service area allow that distributor to pay less per unit of electricity. (See pages 19-20.)

- *Financial Flexibility* – The cost of debt is passed from utilities, including TVA, to customers. Under the current market structure, TVA's customers have experienced a recent price hike to reduce the agency's debt. Regardless of the speed at which restructuring occurs Tennessee customers may see further price increases as TVA passes on the costs of nuclear and other investments to ratepayers. (See page 26.)

- *Transmission and distribution costs* – In a competitive market, the variations in costs of sending power to populations of varying density are expected to persist as a factor driving regional electricity price differences. Areas with flat terrain and concentrated populations are less expensive to serve. The number and capacity of grid interconnections also affect the ease of transmission from region to region, thereby physically constraining the smooth functioning of interregional electricity transfers. (See pages 24-25.)

- *Management efficiencies* – Competition is expected to induce more efficient management throughout the industry, largely equalizing operation efficiency differences. (See pages 23-24.)

- *Taxes* - Differences in taxes lead to differences in the cost of doing business. (See pages 34-41.)

- *Regulations* – Differences in regulatory environments lead to differences in the cost of doing business. (See pages 41-46.)

- *Other state and federal policies* – Public polices that affect the cost of electricity include universal service requirements, environmental regulations, and constraints on the allocation of certain costs and benefits. For example, residential customers or low-income customers may receive tax breaks or subsidies. Congress may attempt to "level the playing field" between public and private utilities' financing and other differences, causing price effects beyond the control of the state. (See pages 5-8, 46-52.)

- *Stranded costs* – Definition of stranded costs and the extent and allowable methods of recovery permitted by legislation or regulation will have significant impacts on consumers' bills. Whether Congress will leave these stranded cost decisions to the states TVA serves is not certain. (See pages 27-34.)

- *Technological change*s – Consumers may realize benefits from innovations like internet trading, data management, real-time pricing, and fuel cells, which will neutralize current market impediments or substitute for electric power altogether. (See pages 25-26.)

- *Current electricity consumptio*n – Tennessee has the highest per-capita electricity use in the country, which may help keep bills low in a competitive market. (See pages 20-21.)

- *Electricity substitutes* – Natural gas consumption per capita in Tennessee is low, and the low cost of and potential market for natural gas may serve as a sort of market-driven price ceiling on electricity. (See page 26.)

- *Reliability of service* – Greater reliability has traditionally meant maintaining excess generation capacity in anticipation of outages, demand spikes, and other "shocks" to the system. However, this reserve capacity is costly. Excess capacity is to some degree being replaced by other, more efficient technical and institutional remedies that may diminish the role reliability plays in cost differences. (See page 46-47.)

- *Energy-related services* – The quality and quantity of both electric and nonelectric services may improve with retail competition. Energy services, such as metering, billing, and providing complementary goods, may constitute a fourth stage of a competitive electric industry. (See page 27.)

Stranded Costs in a Restructured Market

Stranded cost recovery may be one of the primary factors in determining changes in electricity bills. The extent and methods of recovery permitted by legislation or regulation can hinder competition by raising the costs of competition. In a competitive industry, a host of social, political, technological, and economic changes can render previously valuable assets obsolete. Because investment decisions in public or regulated firms are based on criteria other than maximizing profits and shareholder value, changing the rules of the industry – i.e., moving to a competitive, unregulated market – "strands" those investments that were influenced more by public policy considerations than by profitability concerns. In particular, many utilities invested in nuclear power, only to find it difficult to make that power fully productive and ensure that plants meet regulatory standards. The high cost of constructing such plants and complying with NRC regulations left these utilities, including TVA, with large debts, assets, and obligations. Collectively known as "stranded costs," these could raise utilities' average costs significantly. How Tennessee legislation or regulation defines stranded costs and allows for TVA to recover them – assuming that the federal government does not deal comprehensively with those costs – could have a significant impact on customers' bills. (See pages 27-29.)

TVA's nuclear investments pose the biggest potential stranded cost to Valley ratepayers if the federal government does not take responsibility for them. Nonproducing nuclear assets or the debt incurred to build them have been excluded from the utility's revenue requirements and are thus not included in customers' rates until they either become productive or are cancelled. Although TVA maintains that it will cut its debt in half by 2007, it may not be able to cut its debt

and reduce potentially stranded costs so quickly, and depending on government action it will not necessarily have that much time to do so. (See page 29-30.)

TVA's debt should not affect its competitiveness with neighboring utilities, but it does pose a burden to consumers and/or TVA, depending on how and to what degree the debt enters into customers' bills. To the extent that cost recovery is allowed and that debt is currently not being recovered through rates, the debt may lead to higher bills for TVA customers regardless of whether they stay with TVA in a competitive market. As with stranded cost recovery, the portion of debt that TVA cannot recover through rates or other charges will be a detriment to the agency, the magnitude of which depends on how it pays down the debt. TVA is at a considerable disadvantage from a financial efficiency perspective. TVA's ratio of operating revenue to financial expenditures (costs of debt and equity) in 1998 was 3.34, compared to an average of four major regional utilities of 7.92. (See pages 30-31.)

Tax Implications of Competition

Taxes generated by the electric industry in Tennessee are a relatively small but significant percentage of the revenues that fund state and local budgets. State taxes paid in Tennessee by all electric utilities, private and public, plus state sales taxes paid on electricity use constituted an estimated 2.3 percent of total state revenues in 1998. Local property taxes and tax-equivalent payments by electric utilities in 1998 constituted an estimated 1.8 percent of total local operating revenues, or approximately 2.5 percent and 1.3 percent of the total operating revenues for cities and counties, respectively. (See page 36.)

The shift to a competitive electricity market is likely to affect state and local tax revenues and may require the state to adjust the tax system. Competition may even be beneficial from a state budget perspective. The two tax-related concerns facing states are: (a) the impacts of restructuring on state and local tax revenues and (b) the effects of state and local tax policies on competition. Impacts on tax revenue streams may include:

- Prices and usage may change, affecting sales and use tax revenues, gross receipts tax revenues, and potential excise tax revenues of future market entrants.
- Restructuring may affect the role of public power, thereby changing the tax-equivalent payments TVA makes to the state and localities, and what municipal electric systems pay local governments.
- As revenue streams, stranded costs, and the balance of public and private ownership change, there will be valuation effects that impact local property tax revenues.
- Nonresident generators may not have sufficient nexus to be taxed on sales into Tennessee under the current tax system.
- The distribution of taxes between state and local government and among local governments may change with a restructured tax system.

(See pages 36-37.)

Tennessee's tax structure is not appropriate for a competitive electric utility industry. The presence of TVA in Tennessee and uncertainty about its future structure, however, make it difficult to estimate future tax revenues from competition. When a state taxes generation facilities in a regulated environment with set service areas, its tax base is relatively predictable

each year. However, *under the current tax structure* if customers could choose from among providers in other states, the state in which the customers reside might lose the ability to tax the revenue produced by the customers' consumption. (See pages 37-38.)

An electricity consumption tax applied to all electricity consumers may be the most effective means of stabilizing tax revenues in the electric utility industry. Conventional wisdom suggests designing a tax as close to the consumer as possible. Consumption taxes would largely replace gross receipts taxes. Determination of the consumption tax base has to include discussion of consumption-related issues, such as whether to continue to exempt certain types of consumers from the tax and what portions of the bill to tax. (See pages 39-40.)

Any restructuring of the tax base or the types of taxes levied must include decisions regarding the neutrality and equity of the new tax structure. For example, legislators have to consider the tax status of nonprofit companies, the measures necessary to maintain a "level playing field" with respect to taxation among for-profit, nonprofit, and government competitors; whether the overall amount of taxes collected should change, whether the tax burden on different classes of customers should change; how new entrants should be treated relative to existing competitors; and whether and how to hold local governments harmless in the event of revenue losses caused by restructuring. (See page 41.)

Regulatory and Industry Structure

Significant regulatory changes may be needed in the event that Congress substantially restructures TVA and Tennessee restructures its electric utility industry. Currently, regulation of the electric industry in Tennessee is limited to the Tennessee Regulatory Authority's (TRA) regulation of only a few private electric utilities, accounting for only two percent of Tennessee's electricity sales and even less of its generation. The TRA or some other agency would take on significant responsibilities under retail competition. (See pages 42-44.)

The separation of governance and/or ownership, or "unbundling," of the three production stages (generation, transmission, distribution) may be the best way to reduce the risk of market power abuses. Vertical integration occurs when more than one stage of production is performed or partly owned by a single entity. Unbundling requires such an entity to separate into multiple entities, each carrying out only one production stage. Vertical divestiture is the most complete form of unbundling, and probably the most effective for reducing such risks. (See pages 44-45.)

Other Issues for Consideration: Reliability, Universal Service, Economic Development, and Environmental Protection

A competitive electricity market may reduce the costs currently associated with maintaining an adequate electricity supply, but transmission governance changes may be needed to maintain security as well. Current regulation forces adequacy. Although a competitive market may bring different incentives, system adequacy likely will not suffer. In a competitive market, trade in electricity provides the additional and flexible supply source, thereby enhancing the physical reliability of the system without requiring as much investment in

excess capacity. However, oversight of the system's security, such as stability or voltage frequency, may suffer if sufficient institutional changes are not made. (See pages 46-47.)

Various models for structure and governance of transmission and transactions could facilitate an efficiently functioning market and permit legislators to implement transmission-related public policy objectives. Transmission coordination and regulation are necessary to ensure universal, nondiscriminatory access to all suppliers, fair rates of return, and system security. (See pages 47-48.)

As long as distributors' service areas are fixed, retail competition need not inhibit universal service. In a market with retail competition, the Tennessee Regulatory Authority would be the appropriate entity to ensure that all residents of a distributors' service area have access to the distribution lines. If there is concern that marketing efforts will concentrate more on densely populated areas, public information campaigns or requirements that companies selling in Tennessee market to all regions may be solutions. Moreover, "aggregation" can also lower prices in rural and other high-cost areas. (See page 48-49.)

Competition in the electric utility industry should not adversely affect Tennessee's ability to recruit business or its position among competing Southeastern states. Although electricity cost is among the considerations in the location decisions of many industries, research has shown that it is not generally among the top factors in manufacturers' location decision. Although TVA's mission and past record include a focus on regional economic development, large private power companies have also engaged in economic development activities in their regions and would likely continue to have both public relations and profit motives for doing so. (See page 49.)

Without a greater state role in air quality control, competition is not expected to reduce Tennessee's current air quality problems and may adversely affect health and environmental quality in the region. TVA's coal-burning plants are among the oldest and "dirtiest" in the country, and air pollution in Tennessee is considered very high and perceived to be getting worse. Although the Tennessee Department of Environment and Conservation has a pollution permitting procedure, air quality in the state would benefit from stronger regulation or other pollution reduction programs. The state could use a number of methods to protect and improve air quality. These include: taxes, subsidies, public education and pollution monitoring, tradable permits, and mandated pollution reductions. (See pages 49-52.)

Summary of Alternatives and Recommendations

As decisions that affect Tennesseans continue to be made at the national and regional levels, the following may be appropriate considerations for the General Assembly: (See page 53.)

- The Joint Study Committee may wish to continue its deliberations and prepare for whatever actions may come from Congress.
- The General Assembly may wish to define and actively promote Tennesseans' interests in regard to the future of TVA and the impacts of national restructuring legislation on Tennessee.

- Deliberations on the future of Tennessee's electric industry should include broad education of and input from consumers.

In the event that the Tennessee General Assembly chooses to move to a competitive electric industry in Tennessee, then the following recommendations would apply: (See pages 53-55.)

- The General Assembly may wish to move slowly in allowing competition, possibly following the examples of Virginia and Pennsylvania in first pursuing pilot projects.
- If the General Assembly decides restructuring is a desirable goal, then retail competition is probably the preferable approach.
- Unbundling of generation and transmission appears to be the best approach to ensuring fair and open access in a competitive market.
- The General Assembly may wish to allow utilities to recover only "prudently incurred" stranded costs.
- The General Assembly may wish to consider the impacts of imposing a rate reduction, rate cap, or other price-reduction mechanism in restructuring legislation.
- The General Assembly may wish to consider point-of-sale (consumption) taxes to replace the gross receipts taxes and property taxes paid by generators.
- The General Assembly may wish to require utilities selling in Tennessee to establish nexus in the state, and require utilities doing in-state business to agree to abide by conditions that will ensure effective taxation, universal service, and other public policy goals.
- The General Assembly may wish to participate in or develop an independent system operator or some other independent transmission company to maintain open transmission access and increased system reliability.
- The electric distribution system Tennessee currently has, with fixed distribution service areas, should probably remain under retail competition.
- The General Assembly may wish to consider measures for reducing public health and environmental risks from electric generation.

Introduction

Congress, the Clinton Administration, most state legislatures, and state and federal regulatory bodies are debating the issue of restructuring the electric utility industry. Following the examples of airlines and telecommunications, deliberative bodies seek to lessen the regulatory restraints on the electric utility industry in hopes of raising industry efficiency and lowering the costs of electric services to consumers.

In 1997, the General Assembly created the Joint Study Committee on Electric Utility Deregulation, charged with investigating a set of issues relating to electric industry restructuring and competition. Its statutorily defined tasks included: how best to ensure reliability, price, and profit goals; the degree and forms of regulation to maintain in a competitive market; the role of the Tennessee Valley Authority in the process; and the provision of other, nonelectric services.[1] Through the 1998 appropriations bill, the committee requested a report from the Comptroller of the Treasury outlining Tennessee's position in a deregulated market. The request asked:

1. Is competition in electricity markets a desirable goal for the state and, if so, why?
2. What, if any, retail market structure for the electric utility industry would provide for a reliable, competitive electricity supply, meet the demands of a changing industry, and protect environmental quality?
3. What statutory or regulatory changes are necessary or appropriate under competition?
4. Is there an appropriate timetable for competition to be implemented, and what are the necessary steps to make that restructuring transition?

The first and overarching question asks whether competition is desirable for Tennessee. It probably is. However, this answer comes with qualifications. The transition to a competitive retail electric industry requires deregulation of electric generation, restructuring tax and regulatory systems, and a host of other public policy decisions on the part of legislators and regulators. The desirability of competition depends to a considerable degree on these decisions and on their effective implementation. The existing tax system, methods of asset and property valuation, and differences in prices among states and regions are all based on features of an electric industry consisting of integrated and regulated or public monopolies. All of these aspects of the industry will change with competition.

The federal government has yet to act with respect to TVA's future in a competitive market. That eventual action will affect the potential benefits to Tennessee from competition. Other states' actions will also have some bearing on how competition affects Tennessee. Furthermore, once given the ability to restructure, Tennessee's policy decisions with respect to stranded costs, pollution regulation, and public education, among other factors, will determine how and to whom competition is beneficial.

Therefore, adequately answering the committee's questions requires explanations to a complex set of economic, political, and social issues, including: electricity prices, accessibility to and reliability of service, industry debt and stranded costs, taxation, regulation, and public health and environmental impacts. Each of these issues is addressed in this report. Some of the report's conclusions are speculative or reflective of the underlying uncertainties involved in answering

[1] *Tennessee Code Annotated* §§ 3-15-802 and 3-15-804.

the committee's questions. Other conclusions point to specific recommended actions. In recognition of the uncertain and changing nature of the electric industry and the potential for competition in Tennessee, the report highlights specific areas warranting research and deliberation necessary to prepare the state for its decisions.

Methodology

This report is based on the following:

- Review of various bodies of literature concerning the electric industry, in general, and electric utility restructuring, in particular.
- Review of federal and state law.
- Review of proposed federal restructuring legislation.
- Review of other states' deliberations and actions to date with respect to restructuring.
- Interviews with persons having expertise in all aspects of the electric utility industry, particularly as it relates to Tennessee and the Tennessee Valley Authority, including the subject areas of pricing, industrial organization, the law and economics of regulation, tax theory and policy, and environmental quality. Every attempt was made to include representatives of the interest groups concerned with these issues: consumers and producers; public and private sector advocates; academicians and practitioners; federal, state, and local governments. Those interviewed as part of this study are listed in Appendix A.
- Analysis of relevant data from the U.S. Department of Energy, the Securities and Exchange Commission, the Federal Energy Regulatory Commission, the Tennessee Valley Authority, and other federal and state sources.

Background

Industry Overview

For over 60 years, the electric industry has been a set of public and regulated private monopolies. The $200 billion industry consists of three distinct stages: generation, transmission, and distribution.

Power plants generate electricity with coal, gas, nuclear power, hydro power, or renewable resources, such as solar or wind turbines. Over 60 percent of the nation's electricity comes from coal, and almost one quarter comes from nuclear power. Newer technologies include less-expensive combined cycle gas turbines that lower the average cost of generation per kilowatt-hour by lowering fixed investment costs. Electric utilities in the United States generate almost three trillion kilowatt-hours of electricity per year, and the average U.S. household uses over eight hundred kilowatt-hours of electricity per month.[2] Generators send electricity to the transmission network, or grid. The grid facilitates the sale of electricity between generators and is the means of transmitting power from generators to local distributors.

Distributors purchase power from generators and deliver it to the end users, such as residential customers. Distributors may be city-owned utilities (municipals), customer-owned nonprofit utilities (rural electric cooperatives), or investor-owned utilities. They receive high-voltage electricity from generators over the transmission grid and turn that into low-voltage electricity, which is sent over the distributors' lines to customers in a fixed distribution service area. Until recently, distributors did not shop for wholesale power, but rather purchased from a particular generator, often part of the same company as the distributor. Distributors have also traditionally been responsible for billing and marketing.[3]

Tennessee's electric industry has some unique features. Most customers in the United States purchase electricity from integrated utilities, meaning that one entity owns all three stages of production. In Tennessee, the Tennessee Valley Authority provides power with an integrated generation and transmission system to 98 percent of customers in the state, which is served by 63 municipal systems and 23 rural electric cooperatives that purchase electricity exclusively from TVA.[4] For its distributors, TVA also acts as the regulator for the systems' rates and reliability. The only major exception is the greater Kingsport area, which is served by Kingsport Power, a distributor owned by the integrated, investor-owned American Electric Power Company. In addition to Kingsport, the other private utility customers in Tennessee consist of 60 customers served by Entergy Arkansas in West Tennessee and five customers served by Kentucky Utilities Company in Claiborne County. Two other investor-owned utilities, Tapoco and Appalachian Power, sell wholesale power in Tennessee.

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[2] U.S. Department of Energy, Energy Information Administration, *Electric Sales and Revenue, 1997*. As this report will show, usage varies considerably from state to state.

[3] Marketing is the buying and selling of electricity. For distributors, it has been limited to a pre-set customer base that at most may choose between a single electric provider and nonelectric energy options.

[4] In its seven-state service area, there are a total of 159 municipal and cooperative distributors that purchase wholesale power from TVA.

"Direct-serve" customers consume a significant portion of electricity in Tennessee. These are large, energy-intensive industrial facilities that bypass distributors and purchase power directly from TVA. In 1997, 27 such industrial customers purchased over eight million megawatt-hours directly from TVA and represented approximately nine percent of TVA's Tennessee sales (over $230 million).[5]

Restructuring Overview

Historically, electricity has been seen as a natural monopoly because of the high initial investment costs of building generation and transmission networks and the inefficiencies that would result from unrestricted entry into the market. That view has changed for several reasons. Technological innovations in generation have made it cheaper to invest in electricity production, and free-market advocacy has pointed out the lack of incentives for monopolistic utilities to reduce costs, and therefore rates, by adopting those technological as well as managerial and institutional innovations. U.S. Department of Energy economists have estimated a $20 billion savings for U.S. electricity customers as a result of moving to a competitive electric industry, thereby capitalizing on technologies and economic inefficiencies.[6]

Most experts and policy makers continue to see transmission and distribution as natural monopolies, however, because of high investment costs and the desire to maintain reliability and universal service.[7] Thus, "deregulation" primarily refers to the generation stage of the industry, while transmission and distribution may be "restructured" appropriately to accommodate the changes in generation and the potential appearance of firms that handle marketing, billing, metering, and other specialized services that have traditionally been carried out by distributors or have simply been excluded from the set of services utilities offer.

Understanding the differing impact of wholesale versus retail competition is important to discussions of restructuring. Wholesale competition would offer distributors, such as Nashville Electric Service or Knoxville Utilities Board, the opportunity to choose the generators from which to purchase power. Wholesale competition already exists in most states outside the TVA fence. Federal Energy Regulatory Commission Orders 888 and 889 (discussed below) introduced wholesale competition by opening access to the transmission network. Alternatively, retail competition would extend choice to the final consumers, the distributors' customers. In contrast to the traditional industry structure or to a wholesale competitive market, retail competition would largely change the role of the distributors from purchasers and sellers of power to carriers that simply provide the infrastructure and services necessary to facilitate the transfer of power from the transmission grid to the customers.

Some of the issues discussed in this report do not distinguish between the two levels – wholesale and retail – of competition. Reference will be made to the type of competition where relevant.

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[5] U.S. Department of Energy, Energy Information Administration, *Electric Sales and Revenue, 1997*, October 1998, 154.
[6] U.S. Department of Energy, Energy Information Administration, *Electricity Prices in a Competitive Environment: Marginal Cost Pricing of Generation Services and Financial Status of Electric Utilities*, August, 1997.
[7] Brennan et al., *A Shock to the System: Restructuring America's Electricity Industry*, 1996.

Legislative and Regulatory History

Federal legislation has shaped the utility industry over the past 65 years and has also reacted to industry changes and conditions.

Tennessee Valley Authority Act of 1933

On May 18, 1933, President Roosevelt signed the Tennessee Valley Authority (TVA) Act, one of his "New Deal" initiatives. The Act's primary goal was to "improve the navigability of the Tennessee River; to provide for reforestation and the proper use of marginal lands…; to provide for the agricultural and industrial development of said valley; and to provide for the national defense by the creation of a corporation for the operation of government properties…."[8] The agricultural and industrial development aspect of the legislation had the greatest effect on the Valley, giving TVA the power to construct dams, power structures, and transmission lines for an integrated power system.

Public Utility Holding Company Act and Federal Power Act of 1935

Following investigations into private utility companies that uncovered some degree of corruption, the Roosevelt administration passed the Public Utility Holding Company Act (PUHCA) of 1935, which created geographically defined monopolies that generate, transmit, and distribute power. PUHCA also created complex financial and institutional requirements for the electric utility industry. The Securities and Exchange Commission (SEC) oversees and enforces these requirements.

Federal Power Act of 1935

In 1935, the Roosevelt administration also amended the Federal Water Power Act, renaming it the Federal Power Act and expanding the Federal Power Commission's jurisdiction to include the regulation of wholesale rates and sales of electricity as well as interstate transmission. Upon the creation of the U.S. Department of Energy, the Federal Power Commission became the Federal Energy Regulatory Commission (FERC).

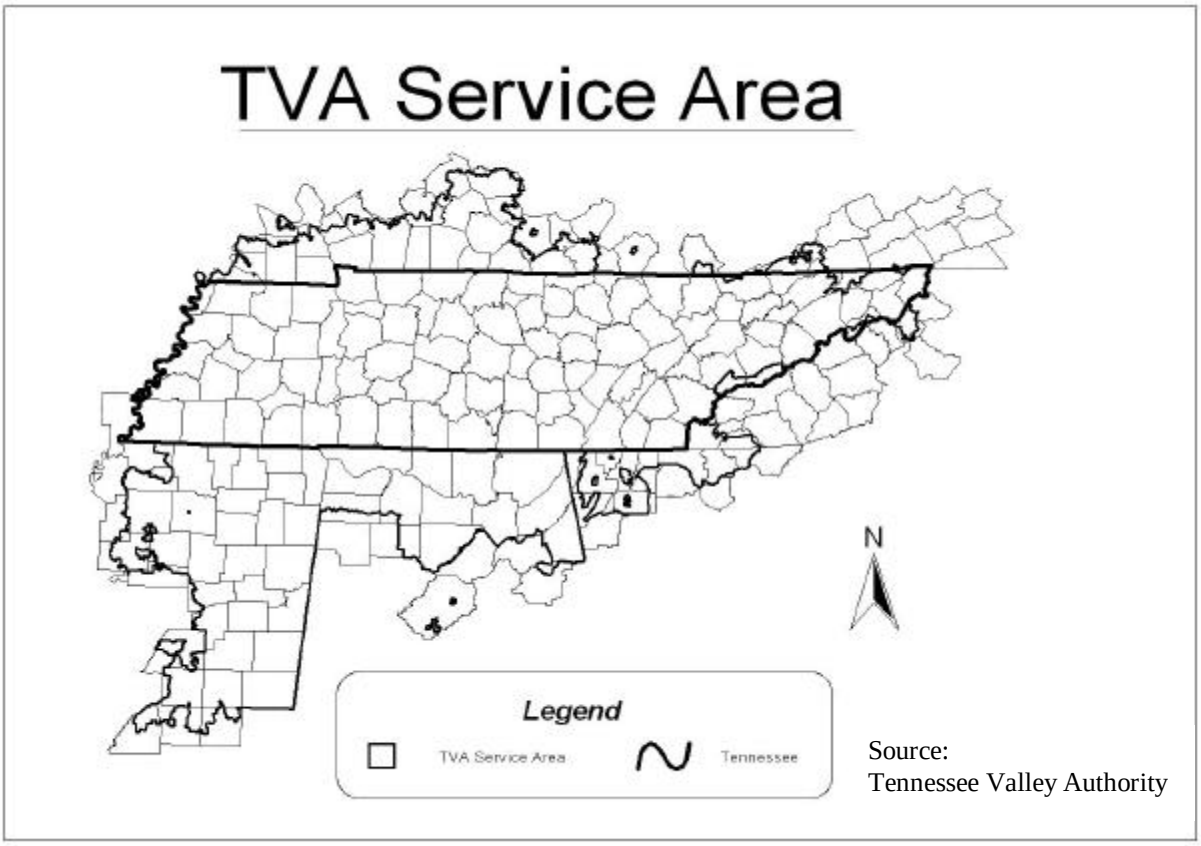
Amended TVA Act of 1959

In 1959, Congress amended the original TVA Act to require that TVA fund power programs solely from electricity revenues and to limit TVA's power sales to a defined geographic territory. That service area is bound by what is commonly known as the "fence."

TVA sells power to 159 distributors in its service area through wholesale power contracts and also directly serves a number of large, industrial customers. For the past 40 years, there have been ten-year rolling contracts (renewed annually) with a ten-year cancellation notice requirement that have required all power to be purchased from TVA. Recent developments in TVA's relationship with its distributors, particularly the five largest (Memphis, Nashville, Knoxville, and Chattanooga, Tennessee, and Huntsville, Alabama), resulted in changes to the

[8] *16 USC Sec. 831n-4.*

contracts. TVA's contracts with its distributors, as was set out in its 1997 10-year business plan, have changed from ten-year rolling contracts to five-year rolling contracts (after 2002), and distributors may now purchase up to five percent of their power from other generators.[9]



Source:
Tennessee Valley Authority

Public Utilities Regulatory Policies Act of 1978

In November, 1978, President Carter signed the Public Utilities Regulatory Policies Act (PURPA) to help combat the energy crisis. The primary purpose of the legislation was to promote conservation by encouraging greater use of alternative sources of power generation. Section 210 of the bill established a class of nonutility generators known as "qualifying facilities" (wind turbines, solar and geothermal units, and other renewable energy sources) and required utilities to buy electricity from these facilities at rates not to exceed the utility's "avoided costs."[10] It also required utilities to sell to and purchase from qualifying facilities. Because the federal government set the rates, it protected ratepayers from having to pay more for power from qualifying facilities.[11] The legislation may have driven up the price of energy, however. Despite its intent, in 1997, nonutility generators accounted for only 7.7 percent of

[9] Tennessee Valley Authority, *1998 Annual Report: The Powerful Balance*; Tennessee Public Power Association, http://www.tvppa.com/committe/com.htm#Rates & Contracts Committee - December 1, 1998.
[10] The "avoided cost" is the cost a utility would have incurred had it been the generator of the power instead of the generator from which it purchased the power.
[11] Brennan et al.

sales,[12] while some estimates hold nonutility generators responsible for 30 percent of all utilities' stranded investment.[13] The legislation also banned discounts for large users. Both TVA and its distributors are exempt from the provisions of PURPA.

Energy Policy Act of 1992 and Federal Energy Regulatory Commission Orders 888 and 889

The legislation and FERC orders introduced wholesale competition by opening transmission lines to all utility and nonutility generators. Utilities owning transmission lines had to open them to other utilities at nondiscriminatory transmission prices.[14] FERC requires that all conditions for use of a transmission system must be the same for all systems regardless of the owner or user.[15] Because of TVA's federal corporation status, it is not required to comply with Orders 888 and 889 or the Energy Policy Act. FERC has jurisdiction over power that travels through TVA's transmission system but not from TVA to distributors within its service area.

Current federal proposals

Much of the legislation before the 105th Congress dealt with repealing current laws and setting a date for deregulation. Dates ranged from 2001 to 2005. Sentiment has changed, however, in the 106th Congress because of ongoing state action to deregulate the industry. Most current federal legislation intends to simply remove impediments to state action by:

- repealing provisions of PUHCA and PURPA;
- amending the federal tax code regarding financing and bond issues for publicly-owned utilities; and
- requiring vertical divestiture[16] of the three stages of electricity production.

Legislation in both the House and Senate have one common characteristic with regard to Tennessee: none deals specifically with TVA. Though some may explicitly leave room to do so, only the Clinton Administration's proposal even addresses TVA and the other federal power marketing administrations, such as the Bonneville Power Administration.

Tennessee Electric System Advisory Committee

Because no legislation had yet addressed TVA, in November, 1997, the U.S. Secretary of Energy asked a subcommittee of his advisory board to develop recommendations for TVA's inclusion in the Clinton administration bill. The Tennessee Valley Electric System Advisory Committee was comprised of various stakeholders throughout the Tennessee Valley, including environmental and consumer advocacy groups, industrial customers, investor-owned utilities, and other interested parties. Tennessee state government, however, was not represented.

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[12] U.S. Department of Energy, Energy Information Administration, *Electric Power Annual, 1997: Volume II*, pp. 12, 87.

[13] PURPA Reform Group, "Overview of PURPA and Rationale for Reform," January 1999, http://www.purpareform.org/rational.htm.

[14] Brennan et al.

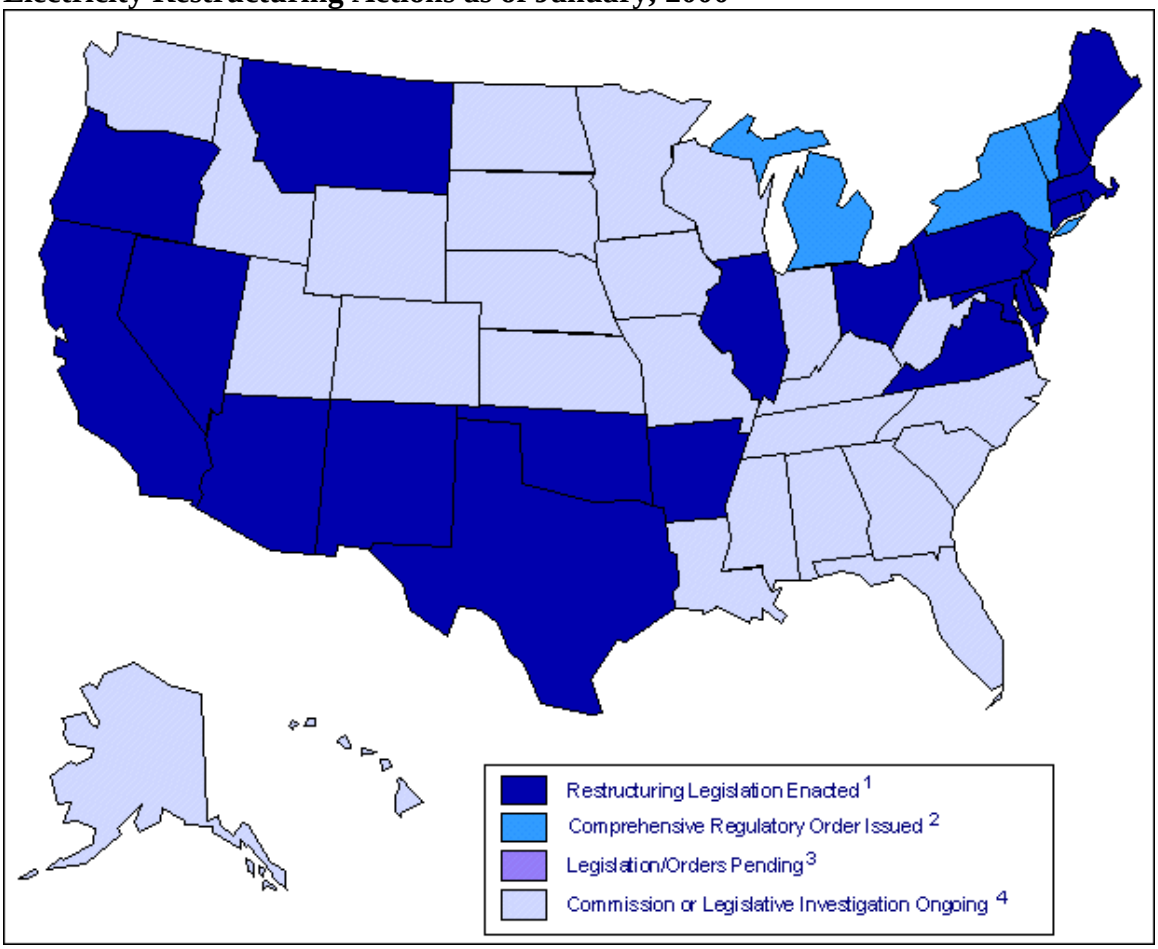
[15] Tennessee Valley Electric System Advisory Committee, *A Report of the Tennessee Valley Electric System Advisory Committee, 1998*, March 31, 1998.

[16] "Vertical divestiture" and other approaches to separating the stages of production will be discussed in the section "Regulatory and Business Structure" and the sub-section on "Industry Structure."

Other States

As of January, 1999, 22 other state legislatures had voted to deregulate their electricity markets; three had instituted competition through regulatory orders; and three had enacted related legislation. Most of the remaining states and the District of Columbia are studying the issue, with only a few states (as of June, 1999) taking no notable action.[17] The following map shows the variation among states in terms of legislative versus regulatory approaches to and overall movement toward restructuring.

Electricity Restructuring Actions as of January, 2000



Source: Energy Information Administration, http://www.eia.doe.gov/cneaf/electricity/chg_str/regmap.html

Thus far, Tennessee's legislation related to electric deregulation has been limited to the formation of the study committee and the permission granted municipal and cooperative electric distributors to offer nonelectricity services, such as television and telephone services. A selection of Tennessee laws applicable to electric utilities are shown in Appendix B.

[17] U.S. Department of Energy, Energy Information Administration, http://www.eia.doe.gov/cneaf/electricity/chg_str/regmap.html; National Rural Electric Cooperative Association, "States Actions to Date on Utility Restructuring," June, 1999.

Analysis and Conclusions

Industry restructuring is a national trend, and Tennessee should prepare to be part of that trend. Taking no preparatory measures – remaining a noncompetitive island in a sea of competitive states – is likely to hurt electricity consumers, providers, and state and local governments. Depending on what legislation the Congress passes and whether Tennessee chooses wholesale or retail competition, changes may be necessary in taxation, regulation, public education, environmental protection, and other public policy tools.

Electricity Rates in a Restructured Market

The geographic variation in and the many factors affecting electricity bills make estimates of the effects of deregulation in Tennessee complex and uncertain. The following will likely affect electricity prices and potential changes in customers' bills under competition:

- *Production costs* (fuel, technology, and labor) account for the biggest share of prices, usually between 60 and 80 percent. Recent technological developments and lower cost fuels should affect overall prices.
- The *cost of debt* is passed from utilities, including TVA, to customers. Utilities incur debt from construction of generation, primarily, as well as transmission facilities and some operating expenses. Construction of nuclear generation facilities is responsible for a large share of utility debt, and thus the concentration of nuclear investments by utility and region is important in determining variations in electricity prices.
- The extent to which utilities are permitted to recover the costs of noncompetitive investments or contracts, called *stranded costs*, will be one of the key determinants of changes in consumers' electricity bills. The effects will depend upon legislative or regulatory definitions of these costs and of the permitted means of recovery.
- *Transmission and distribution costs* vary within and among regions. For example, areas with flat terrain and concentrated populations are less expensive to serve. The number and capacity of grid interconnections[18] also affect the ease of transmission from region to region, thereby physically constraining the smooth functioning of interregional electricity transfers.
- *Reliability* affects rates. Greater reliability has traditionally meant maintaining excess generation capacity in anticipation of outages, demand spikes, and other "shocks" to the system. However, this reserve capacity is costly. As will be discussed, excess capacity is to some degree being replaced by other, more efficient technical and institutional remedies that may diminish the role reliability plays in cost differences.
- States have differing *tax and regulatory structures* that lead to differences in state-imposed business costs.
- The availability of low-cost *substitutes*, such as natural gas, affects both electricity prices and the market power the electricity industry exerts.
- *Public policies* vary among states. For example, residential customers or low-income customers may receive tax breaks or subsidies. States choose to pursue varying levels of environmental quality, and they vary in their social welfare policies, such as subsidization of

[18] Interconnections are the facilities that either connect two systems or connect a nonutility generator to a system.

residential or lower income customers. Federal environmental policies, such as PURPA, may raise the cost of providing electricity for those utilities subject to them.

Economic Gains from Trade

Economic theory and common sense suggest that if trade occurs in a deregulated market, incentives exist for both sellers and buyers. The debate in deregulation centers around the distribution of those incentives. Put another way, "the concern in the low-cost states is less about economic efficiency and more about equity (who gains and who loses)."[19]

This essentially describes a trade-off between profits and prices. In a competitive electricity market, high-cost regions would likely trade electricity producers' profits for lower consumer prices. Conversely, low-cost regions would likely realize increased profits as "compensation" for experiencing higher consumer prices. Overall, economic theory and experience would suggest that the total benefits will outweigh the total costs. Many have suggested that competitive forces will eventually drive down average prices for all consumers. However, there is still uncertainty about how the gains from trade will be distributed among different classes of consumers.

The distribution of economic benefits and costs adds political benefits and costs to the assessment of restructuring. Legislators and regulators must decide government's role in redistributing the gains from increased economic activity to satisfy social or political goals. Under the current environment, the regulation of producer returns is intended to protect residential customers. Whether those subsidies continue depends upon how important legislators perceive them to be.

Rate Variations among States

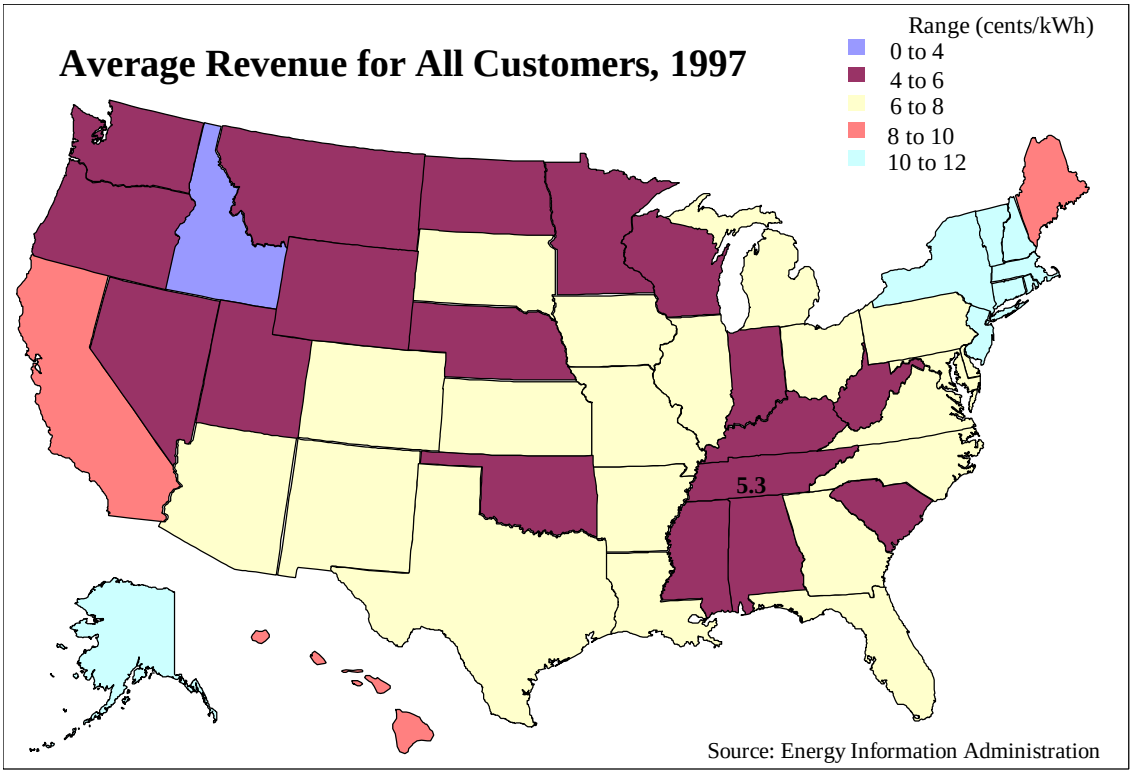
The average prices paid by all classes of Tennessee customers are low relative to most other states, and the current structure effectively subsidizes residential customers. Generally, there is agreement that the lifting of certain regulatory restraints and barriers to trade will result in some amount of electricity price equalization, but there is disagreement as to how much will occur as well as whether and how much prices will decline overall.

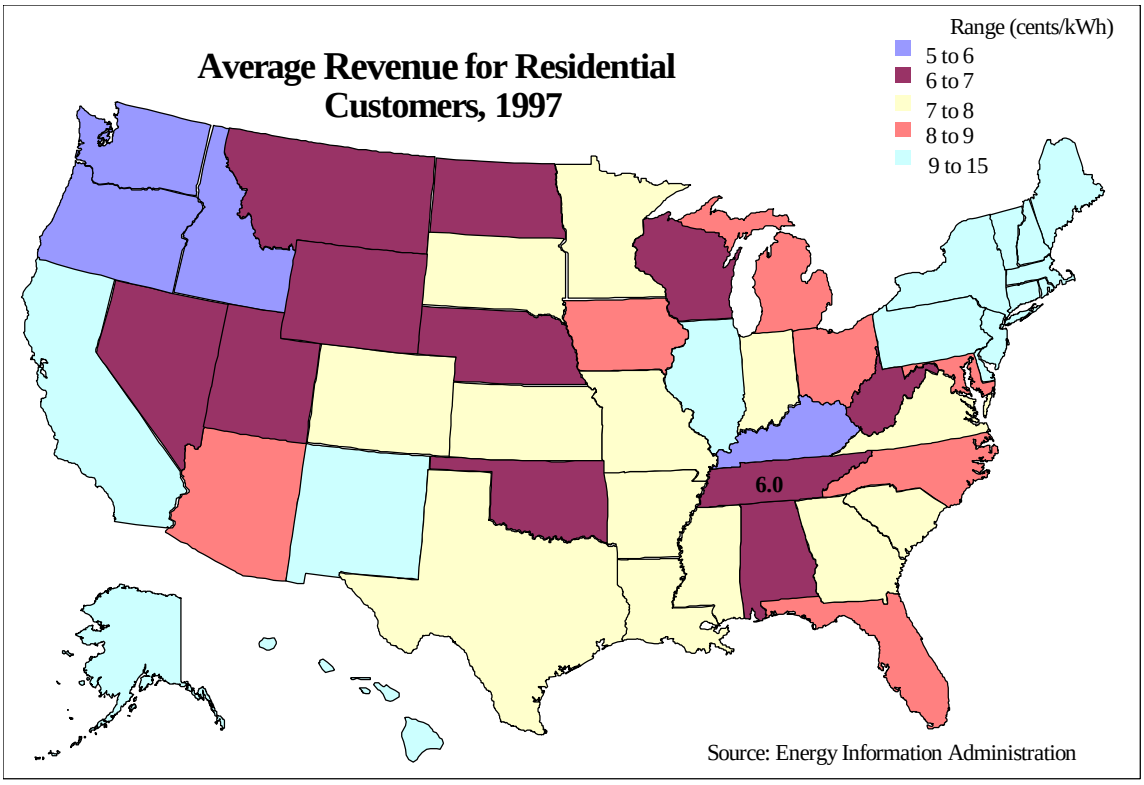
To the extent that price equalization occurs in a competitive market, Tennessee's prices may increase (or decrease) to raise (or lower) Tennessee's position relative to that of other states. The most common opinion is that residential electricity prices are more likely to increase than decrease, and that price decreases are more likely to be experienced by large commercial and industrial customers. However, many factors combine to create rate differences among customer classes and regions, and total equalization of rates nationally is by no means a certainty. Thus, questions remain as to whether price equalization will occur at a regional as opposed to a national level and to what degree there will be differences in the direction and magnitude of price equalization among consumer classes.

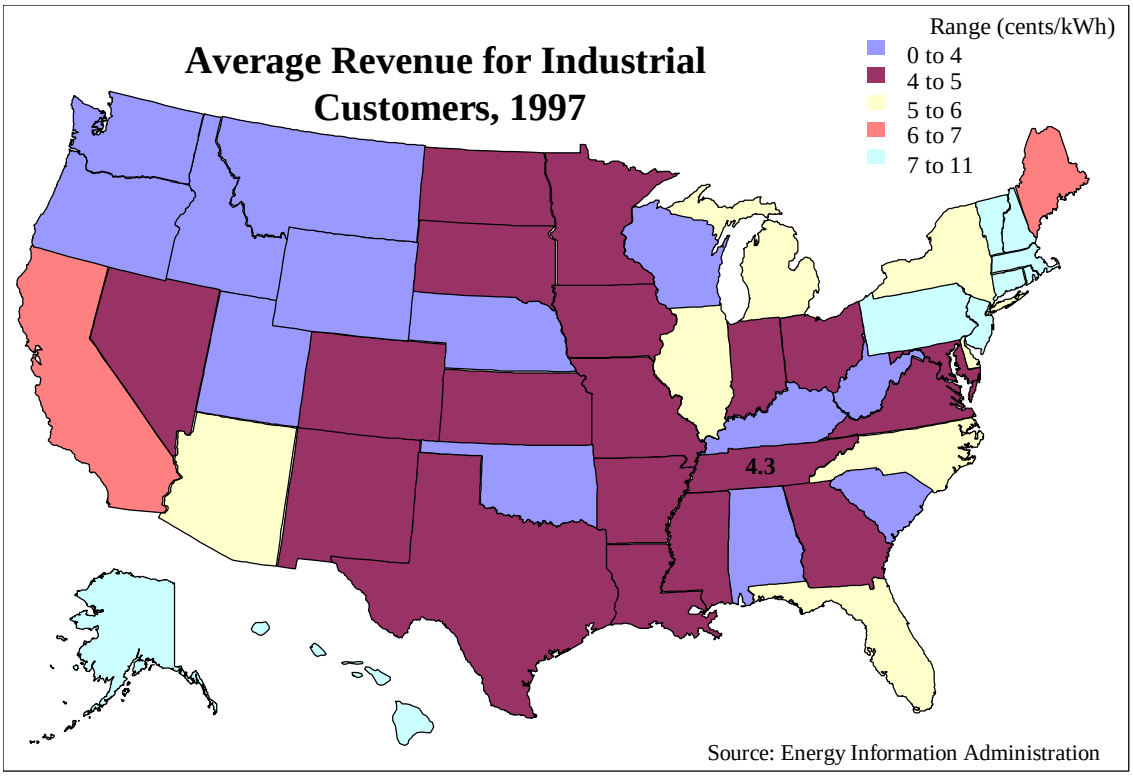
[19] Stan Hadley and Eric Hirst, *Possible Effects of Competition on Electricity Consumers in the Pacific Northwest*. Oak Ridge National Laboratory, January 1998, p. 2.

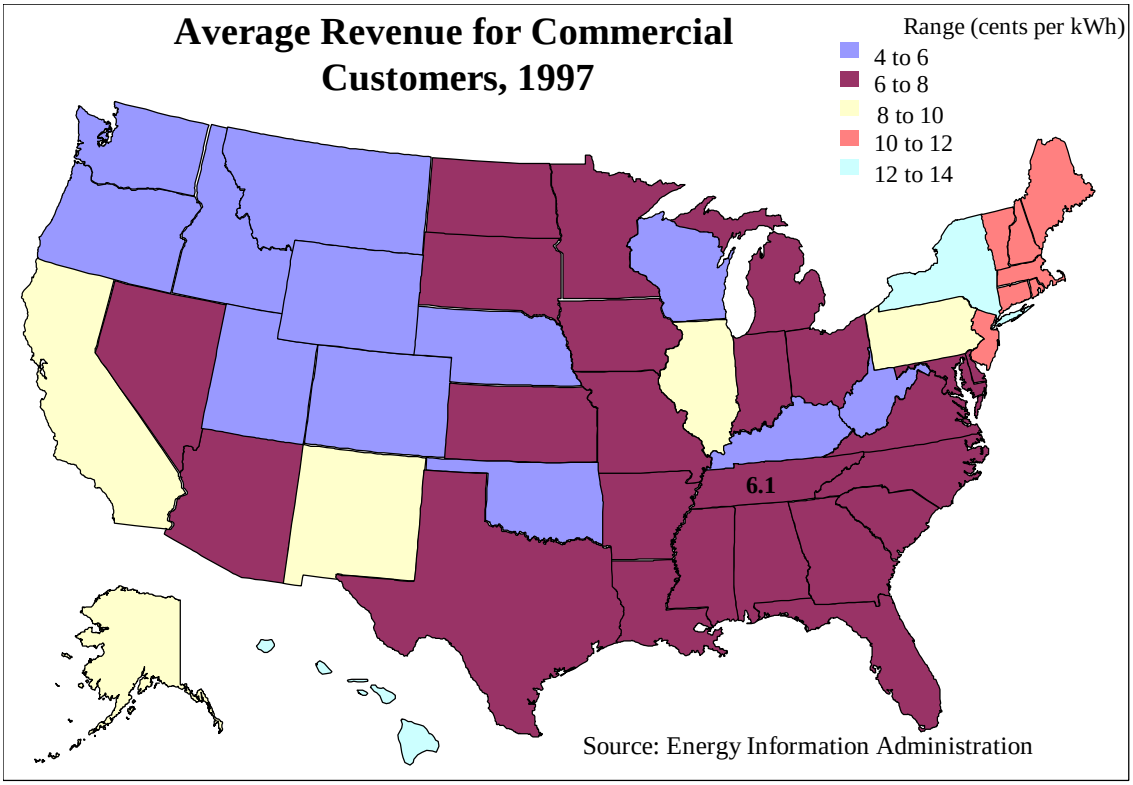
Utilities serve three classes of customers: residential, commercial, and industrial. As discussed earlier, some industrial customers bypass distributors and purchase power directly from generation plants. The following maps indicate the average revenues, by state, both overall and for each customer class. It is preferable to use average revenues rather than average rates because of the countless rate structures that exist across the country. Average revenues better reflect the true value of customer charges. Nationally, Tennessee ranks in the bottom ten percent in average revenues from residential customers, the bottom half for industrial customers, and the bottom third for commercial customers.

The following maps show how Tennessee compares to the other 49 states and the District of Columbia in the average revenue received from various customer classes. These comparisons are summarized in the table following the maps.




Average Revenue for Residential Customers, 1997
Range (cents/kWh)
5 to 6
6 to 7
7 to 8
8 to 9
9 to 15
6.0
Source: Energy Information Administration


Average Revenue for Industrial Customers, 1997
Range (cents/kWh)
0 to 4
4 to 5
5 to 6
6 to 7
7 to 11
4.3
Source: Energy Information Administration



Tennessee's Average Revenue and its U.S. Rank

Customer Class	Average Revenue (cents per kWh)	Rank (out of 51)
All classes	5.3	40th
Residential	6.0	47th
Industrial	4.3	28th
Commercial	6.1	36th

In 1997, Tennessee was the only state in which average revenue from commercial customers was higher than that for residential customers. Tennessee also has the smallest gap between industrial and residential customers of any state. The gaps between residential rates and commercial and industrial rates reflect some degree of subsidization of residential customers by the other classes of customers. Generally, because larger (commercial and industrial) customers purchase larger quantities of electricity, they receive lower prices. A public policy action that keeps residential rates down by limiting the ability of commercial and industrial customers to receive price reductions for buying in bulk, for example, has the same effect as a tax on nonresidential customers to pay for a subsidy for residential customers.

TVA's mission, as delineated in the TVA Act, favors residential and rural electricity consumers at the expense of commercial and industrial consumers. The small rate gap between residential and other classes is an indirect "subsidy" resulting from TVA's reservation of its cheapest power

for residential customers, based on interpretation of the TVA Act.[20] Such subsidization may or may not exist in a competitive market, and its absence would probably cause higher residential prices, all other factors being equal. If the choice of designating cheap (i.e., hydro) power to certain customers is left to the state, then Tennessee will need to consider the benefits to residential customers versus the benefits to business customers. Appendix C shows the gaps between residential average revenue and industrial and commercial average revenue across the United States.

Factors other than price differences make it difficult to determine whether rates will rise or not, and if so by what magnitude. Tennessee currently enjoys low rates relative to the U.S. average, particularly among residential customers. It is widely thought that prices will "level off" around the country, meaning that rates in low-cost states will increase, and rates in high-cost states will decrease. Changes in production costs, for example, will affect prices, potentially pushing prices up in the short run. Countering that, however, will be Tennessee residents' opportunities to purchase electricity from suppliers with lower debt than TVA, and possibly some with lower generation costs. Technological and institutional innovations, adoption of substitute energy sources, tax changes, regulatory changes, and legislative decisions regarding stranded costs and industry structure will all play roles in determining the size and distribution of benefits from electric restructuring.

Aggregation can also play a role in the rates paid in Tennessee. Defined as "consolidating a number of individual customers into a group for the purpose of negotiating pricing and/or services on behalf of the members of the group,"[21] aggregation may be a way for small customers to enjoy market power. Distributors may act as aggregators for their customers, or the customers themselves could organize to bargain for lower rates.

Rate Variations within the Southeast

Among 12 Southeastern states, Tennessee's residential and commercial average revenues are among the lowest, and the state's industrial average revenue is slightly below the average, ranking sixth among the 12 states. However, the average revenue differences between Tennessee and its neighbors are much smaller than the differences between Tennessee and most states outside the Southeast. The following table shows average revenues by class and by state in the Southeast. Again, some of the consumer class differences among states reflect the indirect subsidization of residential customers by commercial and industrial users in Tennessee.

[20] The Tennessee Valley Authority Act, Section 11 (*16 USC Sec. 831j*), states the policy "… that the projects herein provided for shall be considered primarily as for the benefit of the people of the section as a whole and particularly domestic and rural consumers to whom the power can economically be made available, and accordingly that sale to and use by industry shall be a secondary purpose, to be utilized principally to secure a sufficiently high load factor and revenue returns which will permit domestic and rural use at the lowest possible rates and in such a manner as to encourage increased domestic and rural use of electricity." TVA has interpreted Section 11 to mean reserving hydropower for residential customers.

[21] Lackey, Cindy. *Restructuring the Electric Industry*, Council of State Governments, February 1999, p. 52.

Southeast States' Average Revenue as a Percentage of U.S. Average Revenue, 1997 (cents per kWh)

State	Total	Percent of U.S.	Residential	Percent of U.S.	Commercial	Percent of U.S.	Industrial	Percent of U.S.
Alabama	5.3	77%	6.7	79%	6.5	85%	3.8	83%
Arkansas	6.2	90%	7.9	93%	6.8	89%	4.4	96%
Florida	7.3	106%	8.1	96%	6.7	88%	5.2	114%
Georgia	6.4	93%	7.8	92%	7.1	93%	4.2	92%
Kentucky	4.1	60%	5.6	66%	5.2	68%	2.9	64%
Louisiana	6.1	89%	7.6	90%	7.1	93%	4.4	96%
Mississippi	5.9	86%	7.1	84%	6.7	88%	4.2	92%
Missouri	6.1	89%	7.1	84%	6.0	79%	4.5	99%
North Carolina	6.5	94%	8.1	96%	6.4	84%	4.7	103%
South Carolina	5.5	80%	7.6	90%	6.4	84%	3.7	81%
Tennessee	*5.3*	*77%*	*6.0*	*71%*	*6.1*	*80%*	*4.3*	*94%*
Virginia	6.2	90%	7.8	92%	6.0	79%	4.0	88%
U.S.	**6.9**	**100%**	**8.5**	**100%**	**7.6**	**100%**	**4.6**	**100%**

Source: Energy Information Administration

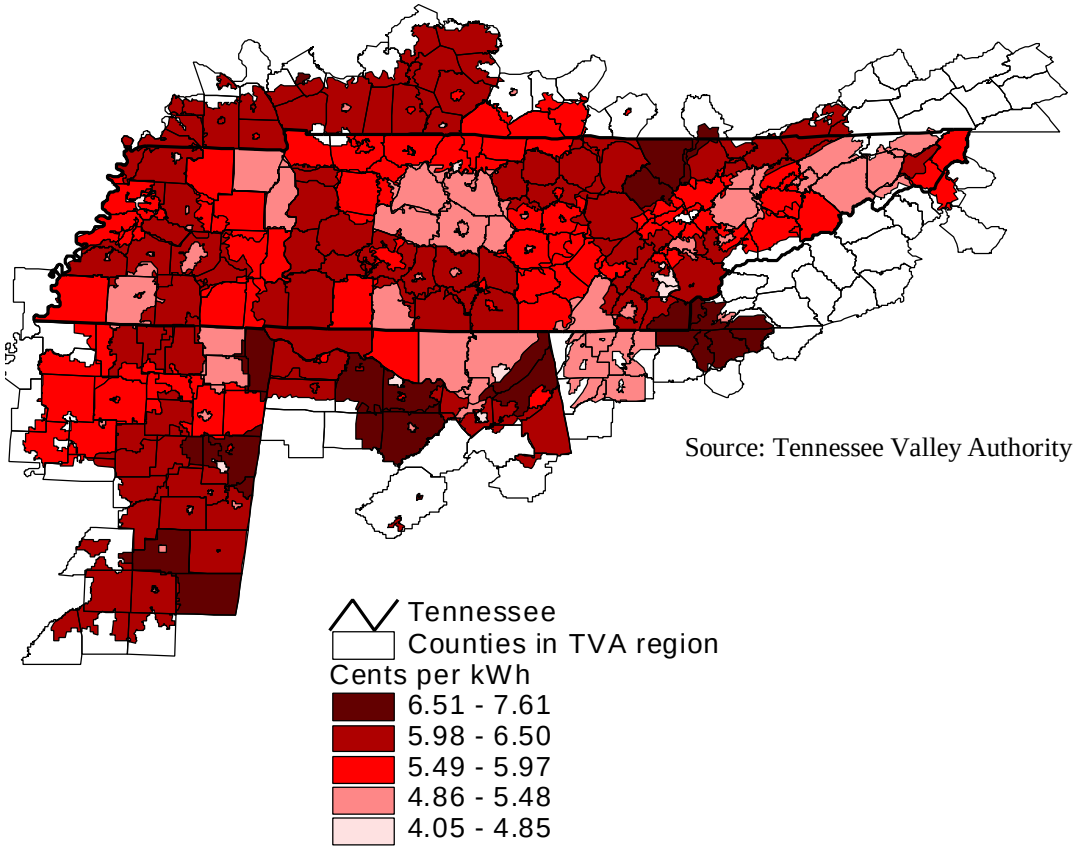
Rate Variations within TVA's Service Area

On average, Tennesseans pay slightly less (about one percent less) than other ratepayers in the TVA service area. In 1997, Tennessee municipal customers paid nearly one-third of a percent more than all TVA municipal customers, and Tennessee cooperative customers paid nearly two percent less than all TVA cooperative customers. These variations are the result of different mixes of customer classes among distributors, differences among (mainly industrial) customers' choices of electric service contracts, and local differences in the cost of doing business. The table in Appendix D shows the average revenues for different classes of consumers within the TVA service area, by distributor. (These customer classifications are different from the more typical "residential," "industrial," and "commercial" classes, instead following the classifications TVA uses in its *Summary of Financial Statistics, Sales, and Rates, 1997*.)

In 1997, Valley distributors had an average revenue from all customers of 5.54 cents per kilowatt-hour. In Tennessee, that average was 5.48 cents. All TVA municipal providers realized average revenues of 5.38 cents and cooperatives, 5.94 cents. For Tennessee, the averages were 5.40 cents for municipals and 5.83 cents for cooperatives.[22]

[22] All TVA service area data come from that agency's *Summary of Financial Statistics, Sales, and Rates, 1997*.

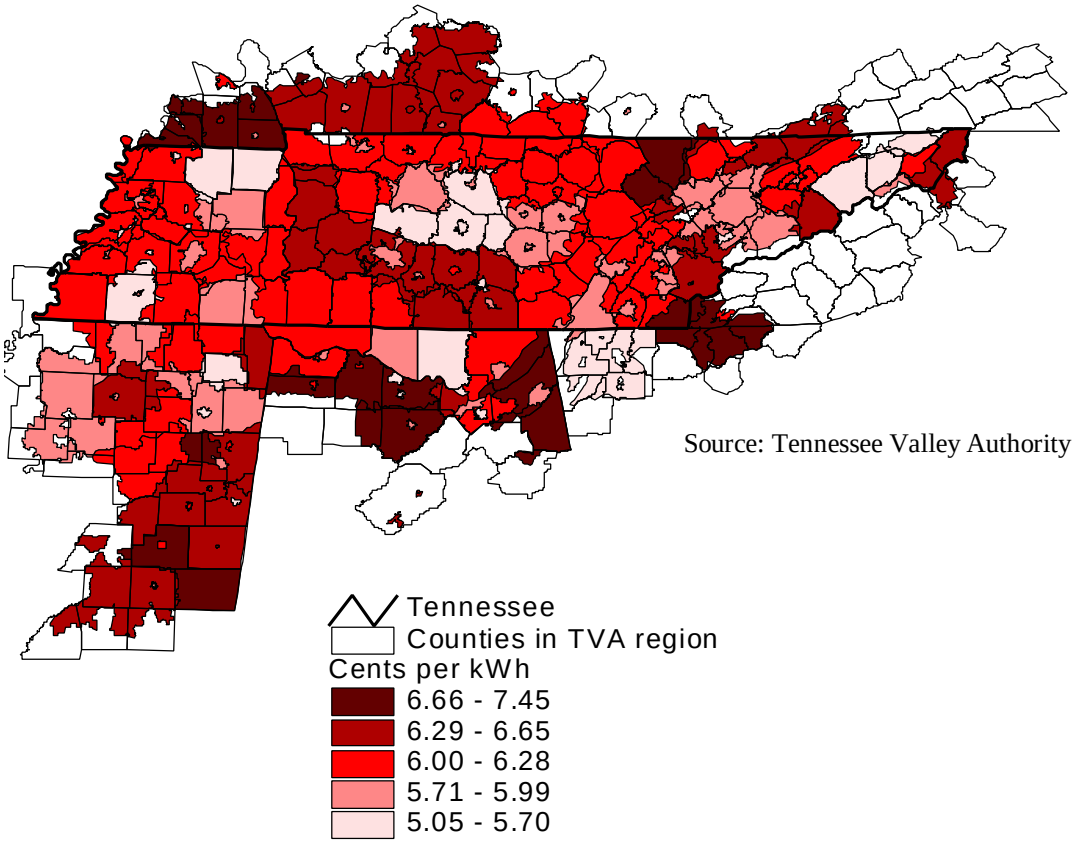
1997 Average Revenue
All Customers



In 1997, Valley distributors had an average revenue from residential customers of 6.01 cents per kilowatt-hour. In Tennessee alone, that average was 5.94 cents. All TVA municipals realized residential average revenues of 5.87 cents and cooperatives, 6.23 cents. For Tennessee, the averages were 5.90 cents for municipals and 6.07 cents for cooperatives.

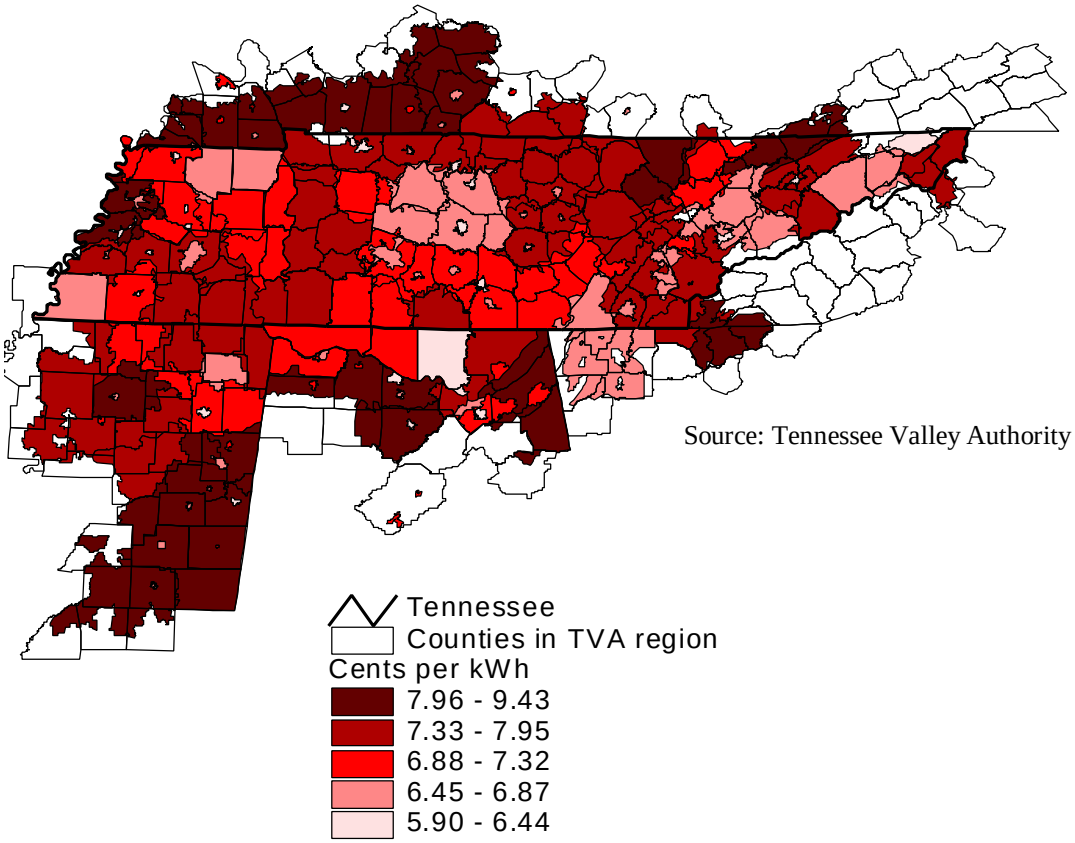
1997 Average Revenue

Residential Customers



In 1997, Valley distributors had an average revenue from small general power customers (up to 50 kWh) of 6.94 cents per kilowatt-hour. In Tennessee alone, that average was 6.80 cents. TVA municipals realized small general power average revenues of 6.66 cents and cooperatives, 7.61 cents. For Tennessee, the averages were 6.67 cents for municipals and 7.34 cents for cooperatives.

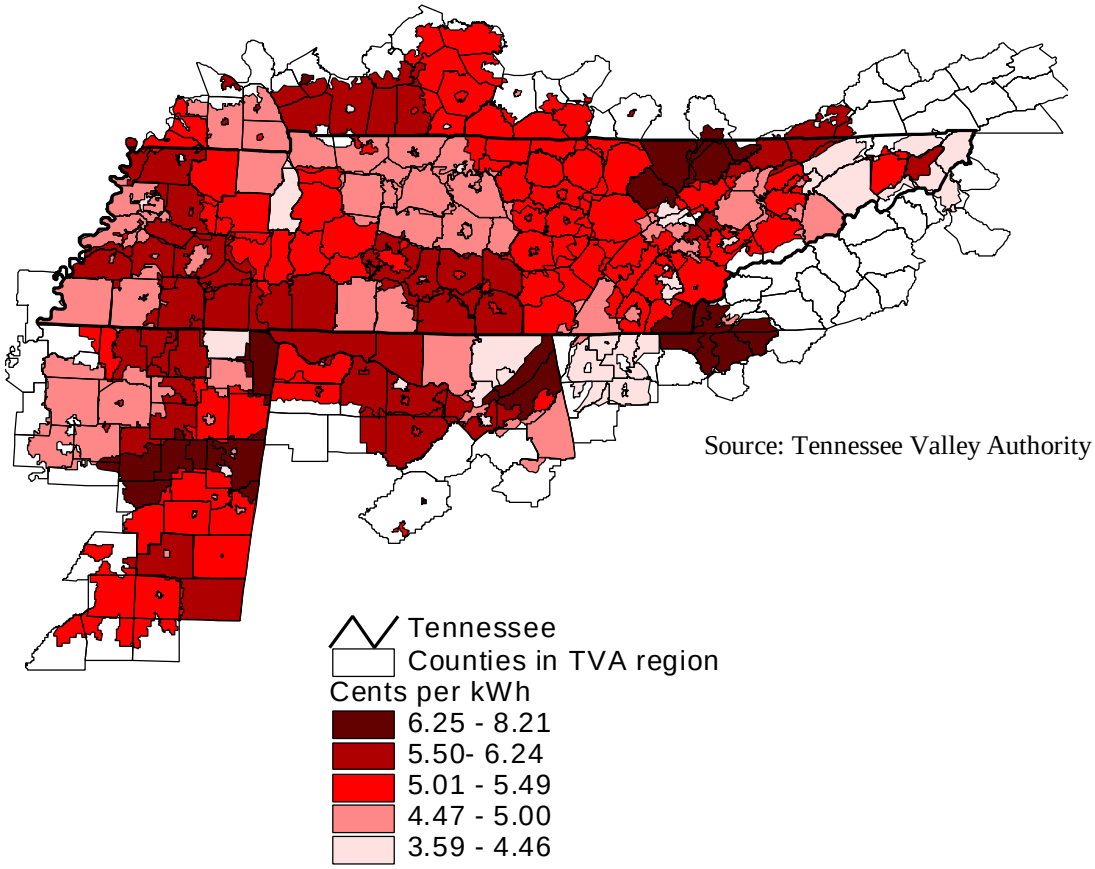
1997 Average Revenue
General Power Customers, up to 50 kWh



In 1997, Valley distributors had an average revenue from large general power customers (above 50 kWh) of 4.87 cents per kilowatt-hour. In Tennessee alone, that average was 4.85 cents. TVA municipals realized large general power average revenues of 4.81 cents and cooperatives, 5.07 cents. For Tennessee, the averages were 4.83 cents for municipals and 5.02 cents for cooperatives.

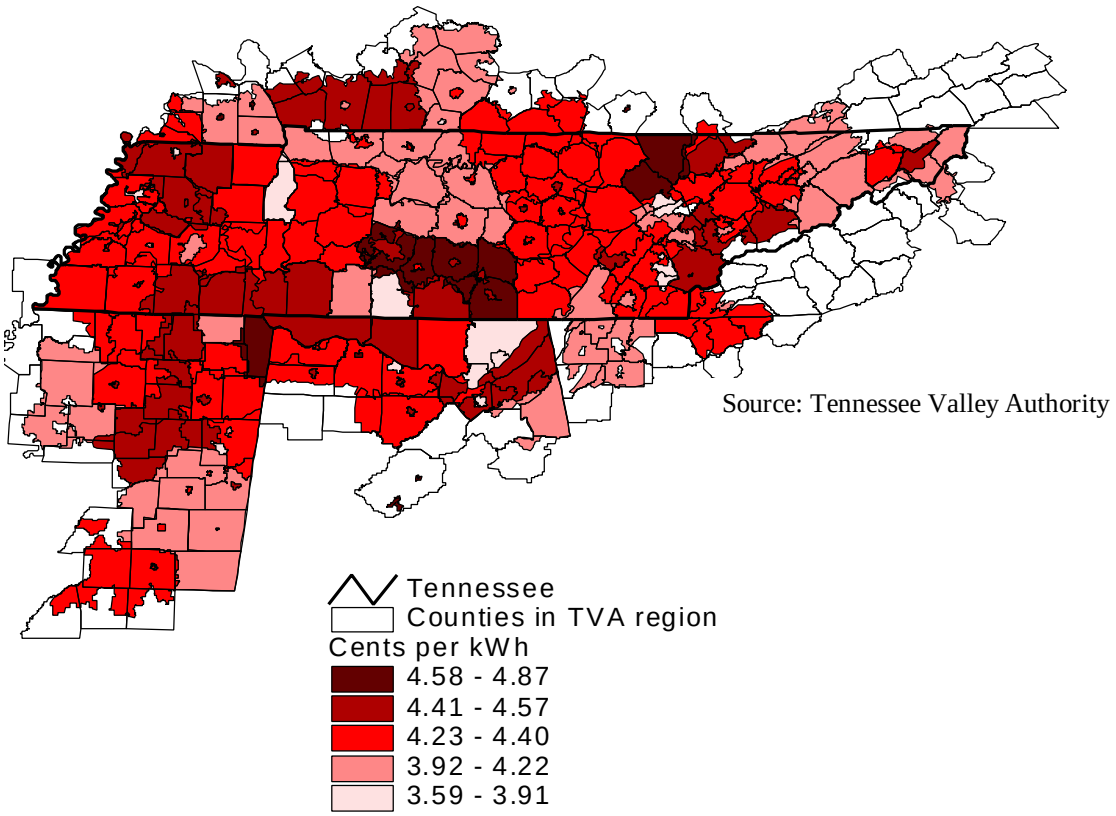
1997 Average Revenue

General Power Customers, over 50 kWh



Although wholesale power costs vary little among TVA distributors, these costs illustrate the role that concentrations of different classes of customers play in determining average rates. Industrial and commercial consumption plays a large role in the rates residential customers pay. Those classes of customers buy larger quantities, and they pay less per unit. The average wholesale power cost (paid to TVA) in 1997 was 4.24 cents by municipals and 4.29 cents by cooperatives. The difference between the wholesale power costs of municipals and cooperatives is largely caused by the difference in the mix of customer classes (residential, industrial, commercial) and to the discounts given for larger wholesale purchases. In a competitive market, the effect of this customer mix on rates is less apparent. The following map shows the distribution of power costs paid to TVA by distributors in its service area.

1997 Distributors' Average Power Cost

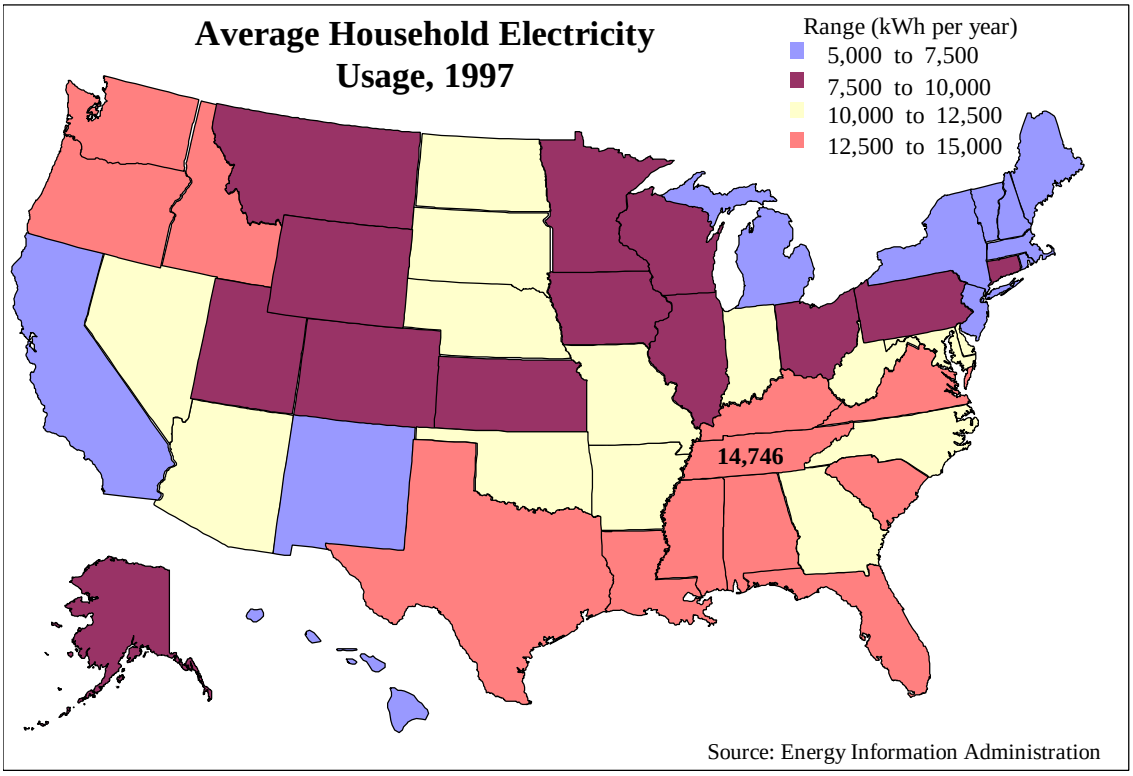


Tennessee has the highest per-capita electricity use in the country, and this may help keep Tennesseans' electricity bills low in a competitive market. Tennessee relies more heavily on electricity than most other states. This has implications for the potential of substitute forms of energy, room for conservation policies, and possible leverage of relatively small populations to achieve low rates in a restructured market. The high per-capita usage means that relatively small populations (than in many other states) appear larger in terms of consumption to potential sellers, giving aggregated customers in Tennessee the potential to bargain for better rates than other areas or groups of comparable population. The high historic reliance on electricity also offers electric energy competitors, such as natural gas providers, a relatively untapped market in which to sell substitutes for electricity.

Average annual electricity usage of residential customers in TVA's service area in 1997 was 14,256 kilowatt-hours, compared to a U.S. per-household average of 9,994 kilowatt-hours.[23] Tennessee alone averaged 14,746 kilowatt-hours in 1997, meaning Tennesseans used more

[23] Usage data in the TVA service area come from Tennessee Valley Authority, *Summary of Financial Statements, Sales Statistics, and Rates*, 1997. Usage data for U.S. consumers come from the Energy Information Administration, *Electric Sales and Revenue*, 1997.

electricity per capita than any other state in the country and 48 percent above the U.S. average. Other regions rely more on natural gas and have been more aggressive in promoting energy conservation, or "demand side management." For example, compared to Tennessee, New Jersey household electricity consumption is slightly less than half, and New Mexico's household usage is about 45 percent of Tennessee's. In the Southeast, Tennessee's neighboring states use between 77 and 92 percent the electricity per household that Tennessee consumes.



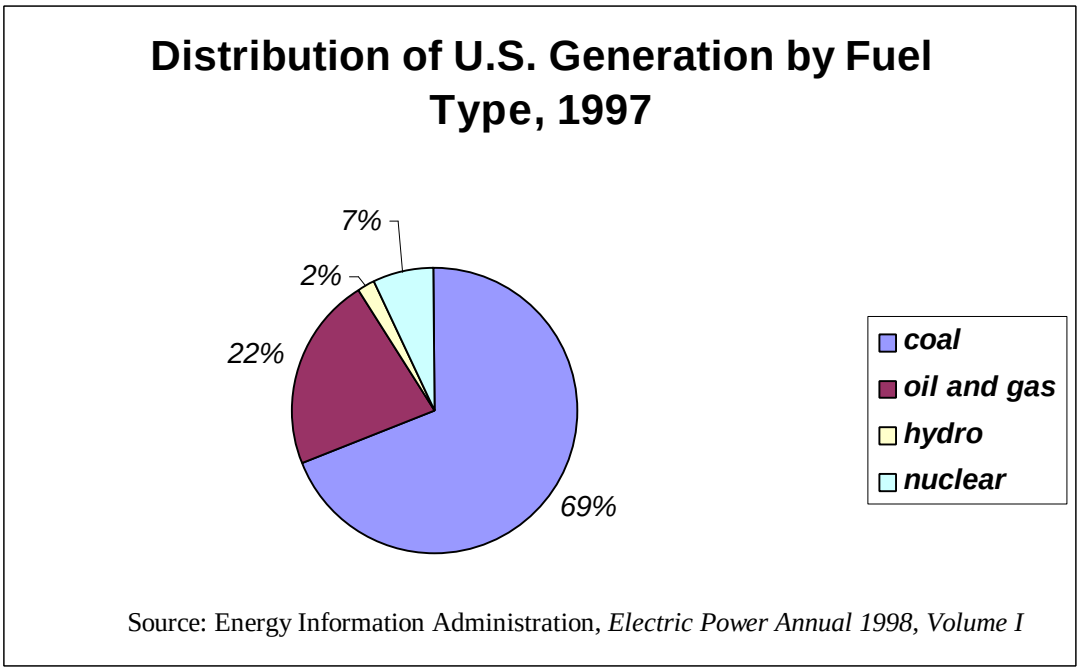
Production and Transmission Costs

Production cost is generally the most important factor determining rate variations between regions. To the extent that transmission infrastructure and market mechanisms permit, the contribution of production costs to price variations is expected to diminish in a competitive market. Production costs vary widely throughout the country and affect retail rates. A sample of 33 companies shows that in August, 1998, production costs varied from 0.98 cents to 3.45 cents per kilowatt-hour for companies in Montana and New York, respectively. Retail rates in that same month varied from 4.02 cents to 14.90 cents per kilowatt-hour in Kentucky and New York, respectively.[24] Production cost differences are attributable primarily to fuel costs (type and transportation), but land and labor factor in as well.

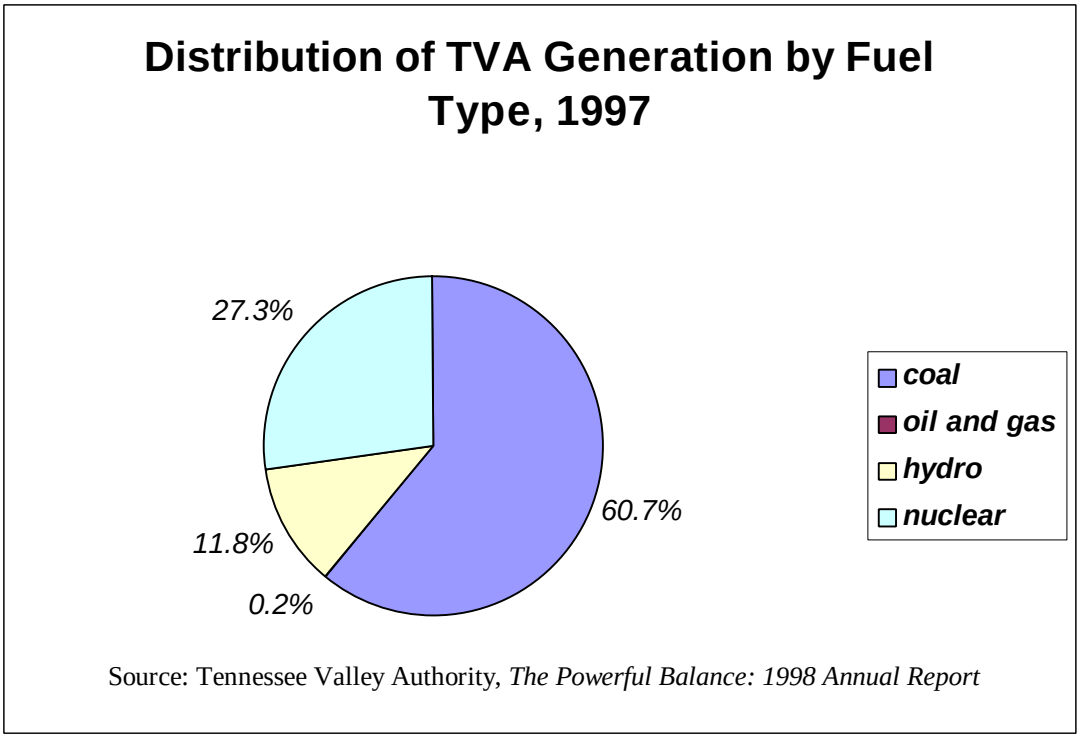
In 1997, TVA production costs varied from 0.40 cents per kilowatt-hour for its lowest cost hydro facility to 8.80 cents per kilowatt-hour for its most costly gas turbine facility, with an average

[24] POWERdat Database, published in *Public Utilities Fortnightly*, February 15, 1999, p. 11. California, Hawaii, and most New England states (all states with fairly high rates) were not included in the sample.

production cost of 1.39 cents per kilowatt-hour for all its generation facilities. Hydro power generally has the lowest marginal production costs, followed by coal, nuclear, and gas. The following figures show the breakdown of fuel types for the entire United States and for TVA.



Source: Energy Information Administration, *Electric Power Annual 1998, Volume I*



Source: Tennessee Valley Authority, *The Powerful Balance: 1998 Annual Report*

TVA has a slightly lower percentage of coal-fired generation and considerably less gas-powered generation than the rest of the country, and it has more hydro and nuclear power. The larger

presence of hydro and nuclear power keeps TVA's marginal production costs lower. However, nuclear power has had other effects on rates in the Valley through the fixed investment costs and regulatory costs it imposes. Although states and regions vary little in terms of the marginal cost of producing power, differences in fixed investments (as well as taxes, regulation, transmission, and distribution costs) create quite a divergence between marginal production cost and average electricity price from region to region. The table below shows how marginal production cost and average price differed in 1995 among different census regions. (Tennessee is in the East South Central region.)

Average and Marginal Cost of Electricity Production by Census Division, 1995 (cents per kWh)

Census Region	Marginal Production Cost	Average Electricity Price	Difference
New England	3.9	9.9	-5.9
Middle Atlantic	3.9	9.2	-5.2
Pacific 2	4.1	9.2	-5.0
Mountain 2	3.8	7.7	-3.9
South Atlantic	3.9	6.4	-2.5
West South Central	3.8	6.1	-2.2
East North Central	3.9	6.0	-2.1
West North Central	3.7	5.8	-2.1
Mountain 1	3.8	5.5	-1.7
East South Central	3.7	5.8	-1.6
Pacific 1	3.8	4.2	-0.3

Source: Energy Information Administration, *The Changing Structure of the Electric Power Industry: An Update*.

Note 1: The states within each region are as follows: New England – Vermont, Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut; Middle Atlantic – New York, New Jersey, Pennsylvania; Pacific 2 – California, Hawaii; Mountain 2 – Arizona, New Mexico; South Atlantic –Delaware, Maryland, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida; West South Central – Oklahoma, Arkansas, Louisiana, Texas; East North Central – Wisconsin, Michigan, Ohio, Indiana, Illinois; West North Central – North Dakota, Minnesota, Iowa, Missouri, Kansas, New England, South Dakota; Mountain 1 – Montana, Wyoming, Colorado, Utah, Nevada, Idaho; East South Central – Kentucky, Tennessee, Alabama, Mississippi; Pacific 1 – Alaska, Washington, Oregon.
Note 2: TVA's territory includes states in the South Atlantic and East South Central divisions, but is primarily in the East South Central division.

Competition is expected to induce more efficient management throughout the industry and, at least partly, to equalize operation efficiency differences. In a noncompetitive industry, regional differences in electricity prices are also affected by the operating efficiency of regional utilities. Compared to other utilities in the region, TVA's operating efficiency is among the highest. The table below shows that the ratio of operating revenue to operating expenses is the highest for TVA among the four regional, investor-owned utilities sampled and higher than the U.S. average for both investor-owned and public utilities. A high ratio of operating revenues to expenses means a utility spends a relatively low proportion of its receipts to operate. The ratio of operating revenues to operating expenses (net of depreciation and taxes) in 1998 was 2.07 for TVA as compared to an average of 1.68 for the sampled Southern utilities, 1.69 for U.S. investor-owned utilities (in 1997), and 1.55 for U.S. public utilities (also in 1997).

Operating Efficiency of TVA and Selected Southeastern Utilities, 1998

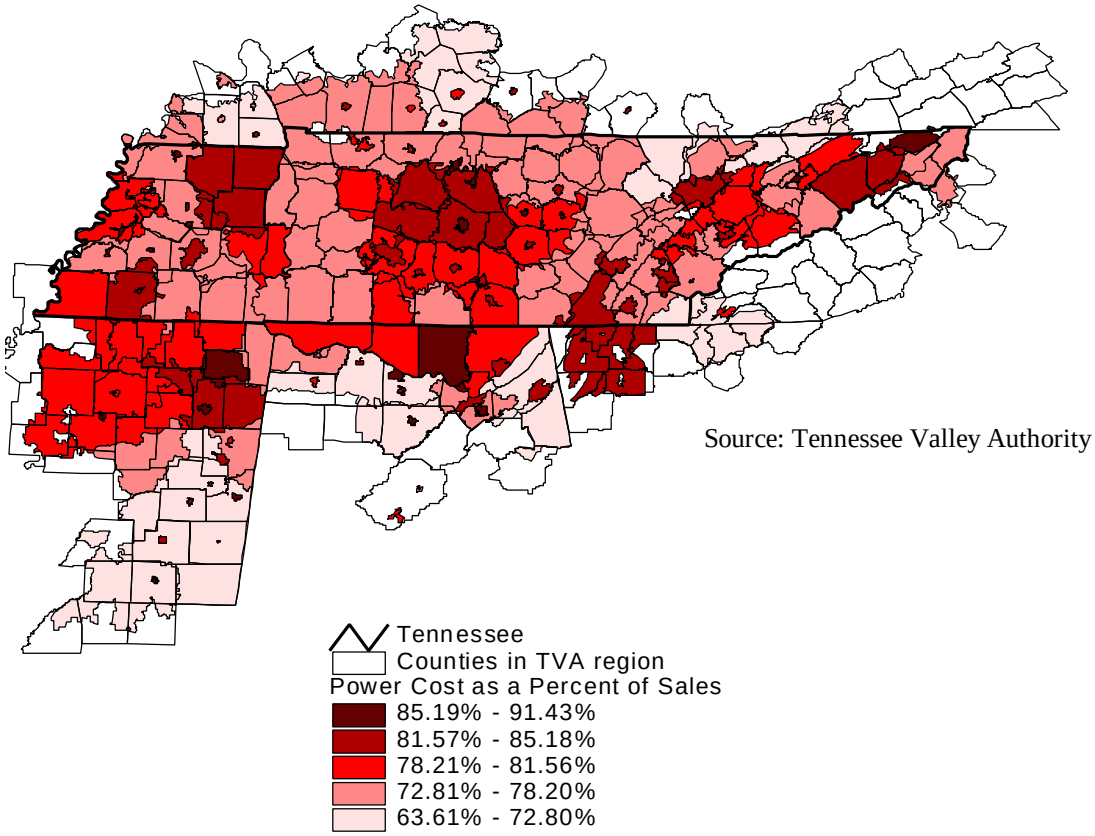
company	Operating revenue	Operating expenses	Ratio of revenue to expenses
AEP System	6,345,902	5,389,168	1.18
Duke Power	4,626,000	3,228,000	1.43
Entergy Arkansas	1,608,698	1,353,883	1.19
Kentucky Utilities Company	810,114	684,726	1.18
Southern Company System	11,403,000	9,650,000	1.18
TVA	6,729,000	4,549,000	**1.48**
U.S. Investor-Owned, 1997	*195,202,204*	*164,465,582*	***1.19***
U.S. Publicly Owned, 1997	*24,573,087*	*19,663,371*	***1.25***
company	**Operating revenue**	**Expenses net taxes and depreciation**	**Ratio of revenue to expenses**
AEP System	6,345,902	3,981,237	1.59
Duke Power	4,626,000	2,326,421	1.99
Entergy Arkansas	1,608,698	1,063,850	1.51
Kentucky Utilities Company	810,114	528,868	1.53
Southern Company System	11,403,000	6,834,000	1.67
TVA	6,729,000	3,247,000	**2.07**
U.S. Investor-Owned, 1997	*195,202,204*	*115,424,221*	***1.69***
U.S. Publicly Owned, 1997	*24,573,087*	*15,851,438*	***1.55***

Sources: Security and Exchange Commission, Selected Forms 10-K; Tennessee Valley Authority, 1998 Annual Report; Energy Information Administration, *Electric Power Annual, 1997: Volume II*. Amounts do not include revenues and expenditures of distributors served by but not owned by the utilities.

In a competitive market, the variations in costs of distributing power to populations of varying density are expected to persist as a factor driving regional electricity price differences. Distribution and transmission costs are higher in regions with more dispersed populations. An open electricity market is expected to reduce regional differences in prices to reflect, primarily, the nongeneration cost differences created by within-region transmission costs, among other factors. The following map uses TVA distributors to illustrate this point. The map shows distributors' "production efficiency," represented as the ratio of power costs to sales revenue. This ratio reflects the proportion of costs coming from nonpower activities, such as building and maintenance of lines and management efficiency. Rural electric cooperatives, generally with fewer customers per square mile, tend to spend relatively more on nonpower inputs. TVA data on its distributors' line losses – the percent of electricity that is lost in transmission from the distributor to the customer – further emphasize this point, showing 4.0 percent line losses for municipal distributors and 5.6 percent line losses for rural cooperatives.[25]

[25] Tennessee Valley Authority, *Summary of Financial Statements, Sales Statistics, and Rates, 1997*, June 30, 1997.

1997 Distributors' Production Efficiency



Transmission constraints may exist that could affect rates as well. The lack of an adequate number of interchange points – points at which different regions' transmission systems are connected – or the cost of moving power through multiple interchanges could contribute to maintaining some of the regional differences that currently differentiate states' average electricity prices. Transmission constraints will persist, however, only until institutional and technological fixes or substitutes are developed. For example, though it may be too expensive to physically transfer electrons from Tennessee to New York, it is possible that electricity may be bought and sold as a commodity, thus transferring "virtual" electrons from Tennessee to New York at Tennessee prices. (Of course, this is only possible if the capacity exists to serve the buyer at the point of purchase.)

Technological Change and Adoption of Potential Substitutes

New technological developments will probably drive down electricity prices over time. As a result of Congress deregulating the telecommunications industry, long-distance service dropped substantially in price. Many opine that lower prices were caused as much by improved

technology as by the end of monopoly power.[26] Consumers may realize benefits from innovations like internet trading, data management, real-time pricing, and fuel cells, which will neutralize current market impediments or substitute for traditional electric power altogether.

Because energy produced by natural gas is a substitute for electric energy, the price and availability of natural gas should act as a check on electricity prices. In 1998, Tennessee per-capita residential gas consumption was 38th in the country and nearly 36 percent below the U.S. average per-capita consumption.[27] Appendix E shows residential natural gas consumption in the states in that year. The low cost of natural gas and the potential market for it in Tennessee poses a sort of market-driven price ceiling on electricity. As the price of electricity rises, it is probable that marketing and consumption of natural gas will rise as well, acting as a check on possible price-increasing effects of electric utility competition.

Financial Flexibility

Under the current market structure TVA's customers have experienced a recent price hike and may see further price increases as TVA passes on the costs of its nuclear and other investments to ratepayers. The cost of debt is paid for through customers' electric rates. TVA has estimated that by 2007, it will have retired half of its debt, putting it in a more competitive position. However, the revenue and cost estimates on which plans to reduce debt are based do not reveal other factors that could force TVA to reduce its contribution to debt service. These include nonpower costs, environmental compliance costs, a need for investment in new generation capacity, and the potential termination of contracts by distributors or customers.[28] In addition, TVA has $6.3 billion in deferred nuclear assets and approximately $2.5 billion in other deferred assets, which have not yet been "written off," and thus have not entered into customers' rates.[29] Future legislative changes dealing with stranded cost recovery or regulatory accounting rules, for example, could affect the role these assets play in electric rates.

Pending Congressional Action

Congress may attempt to "level the playing field" with respect to public and private power providers' different financing capacities. If so, the price effects may reach beyond the control of state governments. TVA and other federal power marketing associations (e.g., Bonneville) have competitive advantages through favorable financing conditions, lower taxes (or tax-equivalents), and less regulatory oversight.[30] For example, many restructuring proposals seek to revise or repeal PURPA, the act that required utilities to purchase cleaner energy from "qualifying facilities." Since TVA is not subject to PURPA, this would remove one of its advantages vis-à-vis its potential investor-owned competitors. Conversely, public power

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[26] William Taylor and Lester D. Taylor, "Postdivestiture Long-Distance Competition in the United States," *American Economic Review*, 1993, p. 83.
[27] U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas. *Natural Gas Annual, 1997*. DOE/EIA-0131(97), October 1998.
[28] U.S. General Accounting Office, *Tennessee Valley Authority: Assessment of the 10-Year Business Plan*, GAO/AIMD-99-142, April 1999.
[29] Tennessee Valley Authority, *1998 Annual Report: The Powerful Balance*.
[30] U.S. General Accounting Office, *Federal Power: The Role of the Power Marketing Administrations in a Restructured Electricity Industry*, GAO/T-RCED/AIMD-99-229, June 1999.

companies do not have the benefit of deferred taxes or equity financing.[31] Because they are public, nonprofit agencies, the power marketing associations do not have to generate returns for investors, and thus do not operate under the same decision-making criteria as private, for-profit companies.

Changes in Quality and Quantity of Services

The quantity and quality of both electric and nonelectric services may improve with retail competition. One of the expected consequences of a competitive electric utility industry is the emergence of a fourth area, or stage, of the industry: energy services. Firms are likely to specialize in metering, billing, and providing complementary goods that utilize the same poles and lines or that help customers to save through conservation. There are also advantages offered by "economies of scope," the cost reductions that companies can achieve by combining infrastructure and personnel on multiple services. These potential cost reductions suggest the likelihood that electric services, telecommunications services, and many other services will be provided by the same company, which would presumably offer savings to customers.

Stranded Costs in a Restructured Market

Stranded cost recovery may be one of the primary factors in determining changes in electricity bills, and the extent and methods of recovery permitted by legislation or regulation can hinder competition by raising the costs of competition. In a competitive industry, a host of social, political, technological, and economic changes can render previously valuable assets obsolete. Private decision makers and investors must account for such risks when evaluating the profitability of an investment. Because investment decisions in public or regulated firms are based on criteria other than maximizing profits and shareholder value, changing the rules of the industry – i.e., moving to a competitive, unregulated market – "strands" those investments that were influenced more by public policy considerations than by profitability concerns. A prime example was partly a consequence of the energy crisis of the 1970s. Concerns over the loss of fossil energy sources influenced the federal government, through the Nuclear Regulatory Commission, to encourage nuclear power as an alternative. Many utilities invested in nuclear power, only to find it difficult to make that power fully productive and ensure that plants meet regulatory standards. The high cost of constructing such plants and complying with NRC regulations left many utilities, including TVA, with large debts, assets, and obligations. Collectively known as "stranded costs," these obligations could raise utilities' average costs significantly.

Stranded costs encompass more than just nuclear investments, however. There are four major categories of costs that could become stranded with the transition to competition. [32] They are:

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[31] These are the major differences. For other possible "level playing field" issues, see example in William J. Museler, "TVA & Electric Utility Restructuring," Presentation to Conference on *Electricity Deregulation in Tennessee*, Murfreesboro, Tennessee, March 30, 1999.

[32] David E. Dismukes, Dmitry V. Mesyanzhinov, and Farhad Niami,. "Recovery of Stranded Investments: Comparing the Electric Utility Industry to Other Recently Deregulated Industries," Presentation at Sixty-Sixth Annual Conference of the Southern Economic Association, Washington, DC, November 23-25, 1996.

1. *Stranded assets* – These are primarily high-cost plants and excess capacity, and as far as TVA is concerned, high-cost plants represent most of the agency's stranded costs.
   a. Nonperforming assets –investments in facilities that have little or no value in a competitive market.
   b. Above-market generating costs – assets that produce power but, due to debt, fuel costs, or age, are not competitive; thus, market fluctuation partly decides the extent to which these generating costs are above-market.
   c. Cost of maintaining existing transmission or distribution facilities with a reduced customer base, to the extent that customers depart from the system.
2. *Stranded liabilities* – These may include purchased or long-term power contracts, primarily above-market purchased power or fixed fuel contract costs. An example is a utility that has entered into a long-term contract to purchase a relatively high-cost fuel. With respect to nuclear facilities, stranded liabilities may also include the added obligation of decommissioning facilities subject to Nuclear Regulatory Commission regulations.
3. *Public policy programs* – These usually come in the form of unfunded mandates requiring low-income assistance, economic development, environmental mitigation, renewable set-asides, or demand-side management. Public policy costs would create stranded costs to the extent that there are asymmetries in the application of policies to different types of utilities or in different regions.
4. *Regulatory assets* – Because of Tennessee's near total reliance on public power, these types of assets are not particularly relevant to the state. In other cases, regulatory assets would include, for example, deferred taxes, a benefit currently given to regulated investor-owned utilities.

The extent to which states adopt competition and the time span for transition to a competitive market will affect stranded costs, and through them rates. In California, for example, stranded cost recovery has stabilized rates in the short run, where they may have dropped otherwise. The stranded cost recovery mechanisms in that state have been partially blamed for the lack of competition thus far in the restructured market.

Stranded Costs throughout the United States

A number of studies have attempted to estimate the magnitude of U.S. electric utilities' stranded costs. The range of figures reflects the uncertainties in estimates of stranded costs in general. The following table shows that some recent nationwide estimates range from a low of just over $5 billion (or about three percent of the estimated industry equity) to a high of $300 billion (over 180 percent of estimated industry equity).

Recent Estimates of Electric Industry Stranded Costs

Study/Source	*Stranded Costs (Billion $)*	*Industry Equity (Billion $)*	*Percent of Total Equity*
Moody's Investor Services			
High	300.0	165.0	181.8%
Low	50.0	165.0	30.3%
Expected	135.0	165.0	81.8%
Oak Ridge National Labs			
High	99.0	165.0	60.0%
Low	69.0	165.0	41.8%
Citizens for a Sound Economy			
High	21.0	165.0	12.7%
Low	5.1	165.0	3.1%
RJ Rudden Associates			
High	46.3	165.0	32.5%
Low	23.2	165.0	14.1%
Institute of Gas Technology			
High	77.9	165.0	47.2%
Low	53.6	165.0	32.5%
Data Resources Incorporated	67.0	165.0	40.6%

Sources: Figures were combined from Dismukes et al., "Recovery of Stranded Investments: Comparing the Electric Utility Industry to Other Recently Deregulated Industries," and Energy Information Agency, *The Changing Structure of the Electric Power Industry: An Update*

TVA's Debt and Potential Stranded Costs

There are no similar estimates of TVA's stranded costs to those given above for the country as a whole. One regional estimate comes from Data Resources Incorporated, which suggested that in 1995 just over 11 percent, or $7.5 billion, of total U.S. stranded costs were in the East South Central census division, the division that includes Tennessee and most of TVA's service area.[33] As with the industry overall, estimates of TVA's stranded costs depend upon the timing and characteristics of any future transition to competition. TVA estimates that it will retire half of its $26 billion debt if current contracts with distributors last until 2007, at which point distributors will not be considered liable for the remaining debt. TVA believes that at half the current debt level, it be competitive and provide power at market rates.[34]

TVA officials have also expressed an opinion that the value of its assets may rise with competition, suggesting an absence of stranded costs altogether (presumably assuming the 2007 minimum length of its distributors' contracts).[35] Although some may consider this to be unrealistic, TVA's confidence in its future competitive position may bode well for Tennesseans

[33] Energy Information Administration, *The Changing Structure of the Electric Power Industry: An Update*, DOE/EIA-0562 (96), December 1996, p. 81.
[34] Tennessee Valley Authority, *1998 Annual Report: The Powerful Balance.*
[35] Memorandum from Jimmy Johnston, Tennessee Valley Authority, December 1998.

and other Tennessee Valley ratepayers in terms of reducing the threat of high transition charges or other rate-increasing measures that are common in states moving toward competition.

TVA's nuclear investments pose the biggest potential stranded cost to Valley ratepayers if the federal government does not take responsibility for them. Nonproducing nuclear assets or the debt incurred to build them have been excluded from the utility's revenue requirements and are thus not included in customers' rates until they either become productive or are cancelled. Included in TVA's debt are $6.3 billion in deferred nuclear assets, which include three nuclear generation units.[36] These are assets that do not currently produce power, and the utility has indefinite plans to use them in the future. These may be considered part of TVA's potential stranded costs.

Although TVA has maintained that it will cut its debt sufficiently to be competitive by 2007, it may not be able to reduce debt and potential stranded costs so quickly. A few of its nuclear facilities could potentially produce revenue, as is the case with the contract for tritium production at the Watts Bar 2 nuclear unit in Rhea County, but most observers see that as unlikely for other nonoperating and incomplete plants. Currently, five of TVA's nine nuclear generation units are on-line and producing power. Three of these are in Tennessee.

In addition to nuclear facilities, TVA's coal plants are among the oldest in the country, making them less attractive as assets and potentially requiring future upgrades or replacements to meet standards of productive efficiency and environmental quality.

TVA's debt should not affect its competitiveness with neighboring utilities, but it does pose a burden to consumers and/or TVA itself, depending on how and to what degree the debt enters into customers' bills. To the extent that cost recovery is allowed and that debt is currently not being recovered through rates, the debt may lead to higher bills for TVA customers regardless of whether they stay with TVA in a competitive market. As with stranded cost recovery, the portion of debt that TVA cannot recover through rates or other charges will be a detriment to the agency, the magnitude of which depends on how it pays down the debt.

The table below shows TVA's financial efficiency compared to some of the surrounding utilities, calculating the ratio of each utility's operating revenue to its financing costs – the costs of debt (interest) and equity (dividends) – as well as allowances for funds used during construction.[37] Even after making these adjustments to include equity, which differentiates TVA from investor-owned utilities, TVA is at a considerable disadvantage from a financial efficiency perspective. Its long-term debt is more than double that of American Electric Power, which has comparable operating revenue, and more than triple that of Southern Company, which has nearly twice TVA's operating revenue. The result is that TVA's ratio of operating revenue to financial expenditures in 1998 was 3.34, compared to an average of four major regional utilities (AEP, Entergy Arkansas, Kentucky Utilities, and Southern Company) of 7.92.

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[36] Tennessee Valley Authority, *1998 Annual Report: The Powerful Balance*.

[37] Methodology is from Allan G. Pulsipher, "Statement by Allan G. Pulsipher," U.S. House of Representatives, Committee on Public Works and Transportation, Subcommittee on Investigations and Oversight, March 9, 1994. Pulsipher's calculations were updated using the most recent available data are from the Securities and Exchange Commission, 1998 10-K filings for the companies included here.

Financial Efficiency of TVA and Selected Southeastern Utilities, 1998

Company	Operating revenue	Interest expenses	Ratio of revenue to expenses
AEP System	6,345,902	419,088	15.14
Entergy Arkansas	1,608,698	88,275	18.22
Kentucky Utilities Company	810,114	40,896	19.81
Southern Company System	11,403,000	1,195,086	9.54
TVA	6,729,000	1,958,945	**3.44**
U.S. Investor-Owned, 1997	*195,202,204*	*13,801,857*	***14.14***
U.S. Publicly Owned, 1997	*24,573,087*	*4,074,820*	***6.03***
Company	**Operating revenue**	**Adjusted interest expenses**	**Ratio of revenue to expenses**
AEP System	6,345,902	887,652	7.15
Entergy Arkansas	1,608,698	201,408	7.99
Kentucky Utilities Company	810,114	119,243	6.79
Southern Company System	11,403,000	1,546,111	7.38
TVA	6,729,000	2,013,945	**3.34**
U.S. Investor-Owned, 1997	*195,202,204*	*33,146,018*	***5.89***
U.S. Publicly Owned, 1997	*24,573,087*	*4,079,140*	***6.02***

Sources: Security and Exchange Commission, Selected Forms 10-K; Tennessee Valley Authority, 1998 Annual Report; Energy Information Administration, *Electric Power Annual, 1997: Volume II.* Amounts do not include revenues and expenditures of distributors served by but not owned by the utilities.

TVA's financial inefficiency may adversely affect Tennesseans' electric rates, though much is dependent on the future decisions of Congress, TVA, and the Tennessee General Assembly. Despite its high operating efficiency relative to other utilities, TVA has a considerable way to go in reducing its financial inefficiency to protect Valley ratepayers from the potential costs competition may bring to their electricity bills.[38]

Other costs and obligations hinder TVA from achieving its debt-reduction timetable. The General Accounting Office recently addressed three factors it believes were not included in TVA's ten-year business plan of July, 1997. Since that business plan sets out the target date of 2007 for reducing the TVA debt to half its size (or down to approximately $14 billion), the exclusion of these costs raises some concern that the agency will not reach its target by that date and therefore will not be prepared by that date for competition. First, though TVA plans to purchase power from other utilities to supply demand growth in its service area, the General Accounting Office believes that there will be additional capital costs to increase generation capacity as well. These capital costs are not included in the business plan. Second, TVA did not factor in the estimated cost of complying with new and proposed environmental regulations. TVA now estimates that this compliance could cost between $500 million to $600 million in plant modifications. Third, the 1997 TVA plan was unable to predict the loss of over $100 million in federal appropriations for nonpower programs, which nonetheless now must be paid

[38] This was the conclusion of a past study of TVA as well, discussed in Allan G. Pulsipher, "TVA and Restructuring: Will More Competitive Markets Put TVA on the Ropes?" *The Electricity Journal*, June, 1991, pp. 46-59.

for out of power program revenues.[39] Recent statements confirming these concerns have been made by TVA's leadership as well.[40]

Stranded Cost Recovery and Legislation in Other States

Stranded cost recovery may take many forms, each with different impacts on consumers, producers, and taxpayers. Numerous approaches[41] may be used to pay for stranded costs including:

- *transmission surcharges* –TVA or a new transmission company could levy this surcharge to pay off its debt. Alternatively, such surcharges could be used to pay back taxpayers for financing that debt. (See "securitization" below.) The burden of this method falls on ratepayers.
- *transition charges* – Levying transition charges[42] is one approach TVA might take to recover the costs of its capital investments. Such charges may discourage competition. However, without them, customers staying with TVA when others depart may be penalized by having to pay for a larger share of the utility's debt. Though presently uncertain, it is possible that the General Assembly will have the responsibility of determining appropriate transition charges or other stranded cost recovery measures if it chooses to pursue restructuring. These are often considered in conjunction with transmission surcharges. Transition charges may be either up-front fees or exit fees. Fees charged up front would be applied to all consumers at the time the state initiates restructuring. Alternatively, exit fees are charges levied only against customers leaving the incumbent utility, compensating the incumbent for the generation costs that the customer's departure strands. The effect of such a policy would be to restrict entry into the industry, but it may restrict entry to the more efficient producers, which could have positive economic implications, at least in the long run. The burden of this method falls on ratepayers and possibly potential competitors, depending on how the fee is structured. Finally, it is worth noting that some states have used per-kilowatt-hour charges to recover stranded costs. Such a charge is often more politically palatable, but it is less economically efficient and less stable than a fixed charge would be.
- *accelerated depreciation* – Prior to allowing competition, accelerated depreciation would allow the utility to more quickly recover its capital costs. The result would be an increase in rates, which are based partly on amortized capital costs.
- *auctioning off transmission facilities* – Selling transmission facilities would only recover the costs of transmission plant investments, and thus to cover stranded costs there would likely still have to be additional transmission surcharges or other fees.

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[39] U.S. General Accounting Office, *Tennessee Valley Authority: Assessment of the 10-Year Business Plan*, GAO/AIMD-99-142, April, 1999.

[40] Jacques Billeaud, "TVA May Fall Short of Goal in Reducing Its Debt," *Knoxville News Sentinel*, September 16, 1999.

[41] Brennan et al., pp. 104-108, and U.S. Department of Energy, Energy Information Administration, *The Changing Structure of the Electric Power Industry: Selected Issues, 1998*, DOE/EIA-0562 (98), July 1998, pp. 59-64.

[42] These are charges levied on customers to pay for the stranded costs created by competition. For example, they may be levied on all customers at the outset, or they may be levied on customers leaving the TVA service area for another supplier. For more on transition charges, see Lester Baxter, Stanton Hadley, and Eric Hirst, "Strategies to Address Transition Costs in the Electricity Industry," Oak Ridge National Laboratories, ORNL/CON-431, July 1996.

- *auctioning off generation facilities* – Auctioning off generation facilities would have the benefit of distributing costly facilities among companies with lower debt levels and with a more dispersed pool of shareholders, thus diffusing the burden of TVA's debt. This option, when combined with other restructuring measures (see discussion of "unbundling" later in this report), is equivalent to the privatization of generation and transmission. Only to the extent that ratepayers in the service area continue to purchase power produced by those same facilities would a portion of TVA's debt would remain with its customers.
- *securitization* – Legislation could allow a utility to pay for stranded costs by issuing debt (i.e., selling bonds) secured by future customer payments, or a charge on customers' bills, thus effectively refinancing present debt and trading a regulated income stream for a lump sum of money. This may or may not benefit consumers, as it transfers the costs of failed investments from the utility to the ratepayers but also makes the utility more competitive and thus able to offer lower rates than would have otherwise been possible.

Because of their already low rates, Tennessee's surrounding states have moved relatively slowly toward competition and, consequently, have passed relatively little legislation addressing stranded cost recovery. However, there are a few examples. Alabama and Virginia have passed legislation to allow utilities to recover stranded costs through a charge, with both states requiring that those costs be "reasonable" and/or "just."[43] The following table gives examples of three other (non-Southern) states' approaches to defining and recovering stranded costs.

[43] Code of Alabama, §37-4-30; Code of Virginia, §56-582 to §56-583.

How Three States Have Dealt with Stranded Costs (as of April, 1998)

State	Composition of Stranded Costs	Recovery Level Permitted	Recovery Mechanism	Procedure for Estimating Stranded Costs	Mitigation Requirement/ Strategies	Projected Recovery Period
California	Generation assets, nuclear power plant settlements, power purchase agreements, qualifying facilities contracts, capital costs of early retirement and retraining programs.	Utilities have the opportunity to recover prudently incurred stranded costs. Nuclear stranded costs may be recovered.	Competitive transition charge (CTC). Utilities authorized to securitize $7.3 billion through issuance of rate reduction bonds.	Market-based approach.	Required.	Four years (through 12/31/01) for generation-related assets. Rate Reduction bond financing would mature 10 years from issue.
Connecticut	Generation assets, generation-related regulatory assets, long-term power purchase contract costs, and others.	Stranded cost recovery is based on the divestiture of all non-nuclear generating assets and aggressive implementation of mitigation strategies.	Recovery of stranded costs will be recouped through a competitive transition assessment (CTA) charge imposed on all customers of an electric distribution company. Utilities may also be authorized to issue rate reduction bonds (RRBs) for specific stranded costs.	The legislation provides a methodology to estimate stranded costs.	Stranded costs must be minimized through mitigation. All generation assets must be divested by 2004.	All RRBs are to be retired no later than December 31, 2011. CTA charges, beginning January 1, 2000, will be imposed until the RRBs are retired on or before December 31, 2011.
Illinois	Categories unspecified.	Opportunity for full recovery.	Transition charge and limited securitization.	Lost revenue approach.	Required. Level of mitigation is reflected in transition charge.	December 31, 2006.

Source: Energy Information Administration, *The Changing Structure of the Electric Power Industry: Selected Issues, 1998.*

Tax Implications of Competition

Utilities' Tax Payments in Tennessee

There are a number of different types of electric power providers in Tennessee, and each type faces a different set of tax obligations. In addition to the various taxes and fees mentioned, all these entities pay unemployment taxes and social security for their employees, and all generators, private and public, pay environmental fees (pollution permits) to the state.

1. Tennessee Valley Authority – TVA is a federal corporation exempt from all federal, state, and local corporate taxes. TVA makes tax-equivalent payments, often referred to as "payments in lieu of taxes," to the states, counties, and cities within its seven-state service

area. Those payments are equal to five percent of its gross power receipts.[44] In 1998, TVA paid approximately $184 million in tax-equivalent payments to state and local governments in Tennessee[45], about 68 percent of TVA's total tax-equivalent payments in all the states it serves. The payments are divided equally (48.5 percent each) between state and local governments – with a small portion dedicated to the Tennessee Advisory Commission on Intergovernmental Relations and to the County Technical Assistance Service – and the remaining three percent allocated to local governments that experience an "impact" from TVA construction in their jurisdictions.

2. Municipal distributors – These are municipally-owned power systems exempt from federal, state, and local taxes.[46] Section 13 of the TVA Act, however, states that TVA can impose certain conditions on its distributors. TVA requires municipal systems to make tax-equivalent payments to local governments within which they operate. The payment formula, set in state statute, is equal to four percent of average net revenue from electric operations from the three preceding fiscal years plus a property assessment.[47] In 1998, Tennessee municipal electric systems paid $76.5 million in tax-equivalent payments to local governments. 77.5 percent of these are paid to city governments, and 22.5 percent are paid to county governments.[48]
3. Rural electric cooperatives – Cooperatives are customer-owned, nonprofit corporations exempt from federal and state income taxes but subject to *ad valorem* taxes assessed by the state and payable to cities and counties. In 1998, Tennessee rural cooperatives paid $12.6 million in taxes to the cities ($1.1 million) and counties ($11.5 million) in which they have property.[49]
4. Investor-owned utilities – Private, investor-owned utilities pay federal corporate income taxes, a number of state taxes (franchise, excise, gross receipts, and corporation fee), local property taxes, and sales taxes. They also pay a Tennessee public service commission fee.[50] Tennessee allows investor-owned utilities to credit their gross receipts taxes against franchise and excise taxes.[51] In 1998, the five investor-owned utilities operating in Tennessee paid a combined $1.8 million in local taxes, and four of the five paid a combined $3.1 million in state taxes and fees.[52]
5. Power marketers – Few of these exist in Tennessee thus far. Power marketers, as Tennessee businesses, pay franchise and excise and all other business taxes, however, they are exempt from the state gross receipts tax by both state and federal law, the latter to the extent that their transactions are interstate in nature.
6. Nonutility generators – Currently, a few non-TVA generation facilities are appearing in Tennessee, such as the plant in Haywood County recently built by Enron Corporation.

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[44] *16 USC Sec. 831l.*
[45] Memorandum from Comptroller W. R. Snodgrass to Commissioner John Ferguson, October 19, 1998.
[46] *Tennessee Code Annotated* § 7-34-116.
[47] *16 USC Sec. 831l; Tennessee Code Annotated* § 7-52-304.
[48] Data were provided by the Tennessee Valley Authority.
[49] Comptroller of the Treasury, Office of State Assessed Properties, *1998 City and County Taxes by Company*.
[50] This fee, addressed in Tennessee Code Annotated § 65-4-301, is a fee for inspection, control, and supervision, also called the "inspection fee."
[51] Federal Energy Regulatory Commission, *Form No. 1: Annual Report of Major Electric Utilities, Licensees, and Others*, pp. 262.3-263.3.
[52] Data were from Federal Energy Regulatory Commission Form 1 and from Tennessee Comptroller of the Treasury, Office of State Assessed Properties. Data were not available showing taxes and fees paid by Entergy Arkansas to Tennessee state government agencies.

"Exempt wholesale generators" are not subject to the gross receipts tax in Tennessee.[53] However, private generators, as corporations, generally pay all other state corporate taxes (e.g., franchise and excise) as well as sales and property taxes.

Significance of Electric Industry Taxes to State and Local Budgets

Taxes generated by the electric industry in Tennessee are a relatively small but significant percentage of the revenues that fund state and local budgets.

The total taxes and tax equivalents paid to Tennessee state government by TVA, municipal and cooperative distributors, and investor-owned utilities operating in Tennessee amounted to approximately $116 million, and total 1995 estimated electricity sales tax collections added another $54 million in state taxes generated by the electric industry in Tennessee.[54] State taxes paid in Tennessee by all electric utilities, private and public, plus state sales taxes paid on electricity use constituted an estimated 2.3 percent of total state revenues in 1998.[55]

Local property taxes and tax-equivalent payments by electric utilities amounted to $157 million. These payments to local governments constituted an estimated 1.8 percent of total local operating revenues.[56] The distribution of these local government revenues between city and county governments is approximately 51 percent and 49 percent, respectively, and they account for an estimated 2.5 percent (cities) and 1.3 percent (counties) of the total operating revenues for those local government divisions.[57]

Taxes and Tax Revenues in a Competitive Market

The shift to a competitive electricity market is likely to affect state and local tax revenues and may require the state to adjust the tax system. Competition may even be beneficial from a state budget perspective. The two tax-related concerns facing states are: (a) the impacts of restructuring on state and local tax revenues and (b) the effects of state and local tax policies on competition.[58] Whether tax revenues increase or decrease with competition depends on market forces as well as public policy decisions.

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[53] *Tennessee Code Annotated* § 67-4-405. An "exempt wholesale generator" is a class of generator created by the federal Energy Policy Act of 1992. This class of generators consists primarily of gas-fired generation facilities, which do not produce large levels of pollutants. They sell power wholesale only and do not own transmission lines.
[54] 1995 is the latest year for which these sales data are considered reliable. The data are from the U.S. Department of Energy's *State Energy Data Report, 1995*. Estimates were made by the Tennessee Department of Revenue.
[55] State revenues include $6,919.3 million in tax collections and $636.5 million in non-tax revenues in 1998. The $116 million includes approximately $1.8 million allocated to the County Technical Assistance Service and the Tennessee Advisory Commission on Inter-governmental Relations.
[56] 1998 local operating revenues were estimated by applying the average annual growth rate in operating revenues from 1993-1995 to the 1995 revenue totals. Data came from the Comptroller of the Treasury, Office of Local Finance, *County and Municipal Finances* for fiscal years ending June, 30, 1993, 1994, and 1995.
[57] These percentages may be slightly off, as some cities and counties have their own agreements regarding the division of these payments among themselves. Our estimates are based on the standard 77.5 percent (city)/22.5 percent (county) split for those municipal distributors' tax-equivalent payments.
[58] National Conference of State Legislatures, "Overview of Effects of the Changing Electric Industry on State and Local Taxes," Item #4129, 1997, p. 3.

Impacts on tax revenue streams:

- Prices and usage may change, affecting sales and use tax revenues, gross receipts tax revenues, and potential franchise and excise tax revenues of future market entrants.
- Restructuring may affect the role of public power, thereby changing the tax-equivalent payments TVA makes to the state and localities, and what municipal electric systems pay local governments.
- As revenue streams, stranded costs, and the balance of public and private ownership change, there will be valuation effects that impact local property tax revenues.
- Nonresident generators may not have sufficient nexus to be taxed for sales into Tennessee under the current tax system.
- Separation of different utility activities or billing may affect sales tax revenues.[59]
- New forms of electric service businesses may not be defined as "utilities" and thus may be subject to a different property assessment rate.
- Restructuring the industry may be accompanied by a restructured tax system, which is likely to alter the distribution of taxes between state and local government and among local governments.

Because a competitive industry is more dynamic than a noncompetitive, regulated industry, the market will respond to different taxes and tax rates within a state and to interstate tax variations in ways that a noncompetitive industry does not. As the state restructures the electric utility industry, it must consider how the existing taxes and any altered or new taxes will affect the competitive position of utilities within the state.

Appendix F summarizes the major taxes that affect the electric industry in Tennessee and some of the ways that tax revenues from those sources may change under competition.

Tennessee's tax structure is inappropriate for a competitive electric utility industry. The presence of TVA in Tennessee and uncertainty about its future structure, however, make it difficult to estimate future tax revenues from competition. When the state taxes generation facilities in a regulated environment with set service areas, the tax base is relatively predictable each year. However, *under the current tax structure*, and if customers could choose to purchase from providers in other states, the state in which the customers reside might lose the ability to tax the revenue produced by the customers' consumption. The ability to maintain the electric industry tax base in the state is crucial to maintaining the stability of that industry as a source of revenue.

However, any utility tax changes must be made with regard for federal laws protecting interstate commerce. The two primary legal limitations on a state's ability to tax generation and transmission activities are the Commerce Clause of the Constitution and Public Law 86-272. The Commerce Clause restricts states from regulating or otherwise interfering with interstate commerce. To tax a generation facility, the taxing state must have sufficient nexus with the source of the generation. The term "nexus" comes from *Miller Brothers Company v. Maryland* (1954) and is defined as the minimum connection the taxing state must have with the entity or

[59] In some states, the gross receipts tax would be affected as well. For example, in Pennsylvania it is defined as a tax on the gross receipts from the sales of electric energy, so that separation of activities or billing reduces the taxable portion of the seller's gross receipts.

activity being taxed.[60] In *Complete Auto Transit, Inc. v. Brady*, the Supreme Court held that a tax on interstate commerce does not stand up to the Commerce Clause unless:

1. the taxpayer has sufficient nexus in the taxing state;
2. the tax is fairly apportioned among all states in which the taxpayer does business;
3. the tax does not discriminate against interstate commerce; and
4. the tax is fairly related to services provided by the taxing state.

The Tax Reform Act of 1986 (Public Law 86-272) restricts states from imposing "a corporate net income tax on an out-of-state seller whose only activity within the state during the year is the solicitation of orders for sales of tangible personal property within the state, provided that orders are approved and the property is delivered from outside the state."[61] The statute also directs the IRS to restrict the use of tax-free financing for private projects, possibly limiting the ability of public power producers to compete outside their service areas due to private use restrictions on publicly financed projects.

Although it has been suggested that some recent state utility taxation actions may tread on federal interstate commerce protections, some states are proceeding with restructuring in a way that attempts to sidestep nexus problems of taxing out-of-state power producers. For example, New Jersey requires any utility doing business within the state – including out-of-state generators selling to New Jersey customers – to establish a physical presence within the state. In Pennsylvania, when a generator has no nexus in the state, the gross receipts tax is applied to the first in-state entity that services the electricity. Pennsylvania is also one of many states that have required utilities to obtain a license, conditioned on the utility's agreement to collect and pay taxes.[62] A Supreme Court decision in *General Motors v. Tracy*[63] may lend judicial support to such "forced nexus techniques."[64]

In addition to the precedents of past judicial decisions, Congressional action will likely determine the fate of TVA, and that in turn will affect Tennessee's tax revenues and the options Tennessee should pursue with respect to the tax system. TVA may cease to be a public entity, or at least sell some portion of its generation facilities. This would increase the number of privately held utility assets in Tennessee, thus changing the type and distribution of taxes paid and most likely increase the overall amount of taxes paid. Alternatively, the TVA "fence" may be opened to competition regardless of TVA's status. Tax revenues could decline or become less stable if consumers are able to buy power from companies outside the TVA service area that Tennessee cannot tax because of insufficient nexus. TVA would then lose its fixed service area, potentially requiring it to market to out-of-state consumers.

A taxation system that is not synchronized with other states' electric utility taxation systems could put in-state producers at a competitive disadvantage or hurt in-state consumers. Just as potential competing utilities may be disadvantaged by the relatively low-tax

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[60] National Conference of State Legislatures, *Introduction to Electric Industry Taxation*, Item #4130, 1997. The decision in this case was also based on the 14th Amendment to the Constitution, which guarantees "due process."
[61] 15 USC Sec. 381.
[62] Federation of Tax Administrators, "Electric Utility Taxation Under Deregulation," *State Tax Notes*, January 18, 1999, pp. 177-194.
[63] 519 U.S. 278 (1997).
[64] Federation of Tax Administrators, p. 179.

status of public power in Tennessee, the state should be careful that any changes in the taxation or industrial organization of its electric utility industry do no more than even the balance and do not shift it to favor non-Tennessee producers. A comparison of the taxes paid by some neighboring utilities and those paid on average by U.S. utilities offers some understanding of how low tax (or tax-equivalent) burdens have benefited Valley consumers. The following table compares TVA and its distributors' tax-equivalent payments to the taxes (excluding state and federal corporate income taxes[65]) paid by five neighboring investor-owned utilities in 1998, as well as the average 1997 taxes and tax-equivalent payments of U.S. investor-owned and public utilities. The table also calculates these tax payments as a percent of operating revenue, giving a more accurate depiction of taxes relative to the utilities' size. Note, however, that the comparability of TVA with investor-owned utilities is limited. As previously noted, investor-owned utilities also pay federal and state corporate income taxes, from which TVA and its distributors are exempt. Public power providers are not required to generate profits on which private utilities' income taxes are levied, and so no comparison may be made in that regard.

Non-Income Taxes and Tax Equivalents of TVA and Selected Southeastern Utilities, 1998

company	Operating revenue (thousand dollars)	Taxes or tax equivalents (thousand dollars)	Taxes as percent of operating revenue
AEP System	6,345,902	493,386	7.8%
Duke Power	4,626,000	175,469	3.8%
Entergy Arkansas	1,608,698	37,223	2.3%
Kentucky Utilities Company	810,114	15,945	2.0%
Southern Company System	11,403,000	599,000	5.3%
TVA and Distributors	12,855,938	411,600	3.2%
TVA Only	6,729,000	264,000	3.9%
non-TVA average	24,793,714	1,321,023	**5.3%**
U.S. Investor-Owned, 1997	195,202,204	14,188,266	**7.3%**
U.S. Publicly Owned, 1997	24,573,087	621,773	**2.5%**

Sources: Security and Exchange Commission, Selected Forms 10-K; Tennessee Valley Authority, 1998 Annual Report; Energy Information Administration*Electric Power Annual, 1997: Volume II* Amounts for TVA do not include revenues and expenditures of distributors in TVA's service area.

The results show that TVA alone paid 3.9 percent of its operating revenue in tax-equivalent payments in 1998, and TVA and its distributors combined paid 3.2 percent of their total operating revenues in taxes and tax-equivalent payments. In both cases, the percentage is more on average than other U.S. public utilities (2.5 percent), but less on average than the investor-owned utilities in the regional sample (5.3 percent) or the country as a whole (7.3 percent).

An electricity consumption tax applied to all electricity consumers may be the most effective means of stabilizing tax revenues in the electric utility industry. Conventional

[65] Though the state would clearly receive greater corporate income tax revenues as the result of any TVA privatization, it is difficult to make net income comparisons between the not-for-profit TVA and Valley distributors and the for-profit investor-owned utilities.

wisdom suggests designing a tax as close to the consumer as possible. Consumption taxes would largely replace gross receipts taxes.[66]

There are a number of determinations and clarifications that must be made in order to properly structure an electricity consumption tax:

- The tax should be priced per unit of electricity rather than per dollar. Generally this is in the form of a tax per kilowatt-hour.
- It may be levied on the distributor as a tax per unit sold, as is done in Ohio, or on the consumer as a tax per unit consumed, as is done in Illinois. Since the distributor would collect the tax and the consumer would bear the burden of the tax in either case, the decision to craft it as a tax on the distributor versus the consumer is essentially a political choice. If the tax is levied on the distributor, then it does not necessarily have to appear on the consumer's bill as a separate item.
- Currently, electricity sales to residential and manufacturing customers are exempt from the sales tax. The General Assembly would have to weigh its revenue goals with its public policy goals in deciding whether to maintain these exemptions. However, keeping residential and manufacturing usage out of the tax base would significantly reduce the base.
- Whether or not to exempt sales to nonprofit or government organizations should also be considered.
- Generally, industry restructuring plans include some degree of separation (called "unbundling") of generation, transmission, and distribution. Assuming that these activities – and potentially other activities – are separate line items on an electricity bill, any statute creating an electricity consumption tax must define whether the value of all these activities or only some of them are subject to the tax.

The Virginia State Assembly, in Senate Bill 1286,[67] approved a measure to allow a consumption tax that would replace the gross receipts taxes paid by utilities. Because utilities currently pass gross receipts taxes onto the consumer, the consumption tax is not expected to result in an increase on a customer's electric bill. New Jersey also opted to phase out the gross utilities (receipts) tax, to make all utilities subject to the state's corporate business tax, and to apply sales tax to all retail sales of electricity and natural gas, excluding nonprofit and government consumers.[68]

A consumption tax on electricity would probably be collected by the distributor as a charge per kilowatt-hour. Any consideration of a use tax for electricity might be considered in tandem with a similar tax on natural gas as well, as the two are substitute forms of energy. A consumption tax does not necessarily require deregulation to take place prior to its implementation and might even be considered as a reform to the tax system under the current industry structure.

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[66] Some of the issues raised here were discussed at a roundtable session on "Tax Implications of Deregulating Utilities" at the September 27, 1999 Revenue Estimating and Tax Research Conference of the Federation of Tax Administrators.

[67] Code of Virginia, §58.1-2900 to §58.1-2903.

[68] National Conference of State Legislatures, *Gross Receipts Taxes in the Changing U.S. Electric Industry*, Item #4137, 1997.

Even if Tennessee replaced taxes on generation facilities with an electricity consumption tax, transmission and distribution would likely continue to be taxed based on gross receipts or property. Because transmission and distribution are expected to continue as regulated monopolies, even in a market with retail competition, the gross receipts and property in those stages would continue to provide a relatively stable tax base. Thus, it is possible to continue to tax gross receipts and property in those stages without the kinds of negative repercussions that would result from taxing generation under the existing tax structure.

Any restructuring of the tax base or the types of taxes levied must include decisions regarding the neutrality and equity of the new tax structure. For example, legislators will determine:

- whether and how to maintain a "level playing field" with respect to taxation among for-profit, nonprofit, and government competitors;
- whether the overall amount of taxes collected should rise, drop, or stay about the same;
- whether the tax burden on different classes of customers should change;
- whether the tax burden on new entrants to the market should be comparable to that of existing competitors;
- whether and how to hold local governments harmless in the event of revenue losses caused by restructuring.

Regarding this last point, restructuring the electric utility industry, if it includes either privatization of some part of TVA or a change in the current tax-equivalent system, may result in a reduction of the tax-equivalent payments made by TVA to local governments. These payments would be replaced by other types of tax revenues, but those new taxes would not necessarily be paid to local governments. Revenue-sharing arrangements between the state and local governments are one way to replace lost local revenue in this case. In addition, changes in definition and assessment of utility property or other changes may also affect local government revenues.

Regulatory and Industry Structure

Regulation of Utilities

State regulatory control over the electric industry within Tennessee varies depending on whether the service is provided by TVA and the municipal and cooperative distributors purchasing from TVA or by private utilities.

Section 12 of the TVA Act of 1933 gives TVA the authority to regulate universal service and the rates of municipal and cooperative distributors. TVA, for the most part, is self-regulating. As a federal corporation, it is exempt from many of the federal regulations that apply to investor-owned utilities. TVA is subject to FERC control through the Federal Power Act. FERC can regulate transmission *through* but not *to* TVA's service area. The Nuclear Regulatory Commission also has some jurisdiction over TVA's nuclear facilities, and the Tennessee Department of Environment and Conservation and the U.S. Environmental Protection Agency oversee TVA with respect to air pollution regulations. The TVA board sets rates and has control

over plans for the power program.[69] To some degree, the distributors in TVA's service area are self-regulating, in that they have latitude to make small rate changes and other decisions without TVA approval or any oversight other than that of their governing bodies.

The statute authorizing the Tennessee Regulatory Authority (TRA) to regulate utilities engaging in retail sales within the state excludes municipal corporations, rural cooperatives, federal corporations, and "any utility engaged in interstate commerce."[70] The decision in *Tennessee Public Service Commission v. Nashville Gas Company* states, however, that while a company may be regulated by the Federal Power Commission (now FERC), a wholly-owned subsidiary engaged in local sales is subject to rate base and rate structure regulation by the Public Service Commission (now the TRA).[71] Such is the case with Kingsport Power, a subsidiary of American Electric Power, and the only electric utility with which the TRA has significant interaction.

Regulation of utilities at the state level includes:

- approving rates by determining a reasonable return above costs;
- setting service standards and accounting procedures;
- issuing certificates of convenience and public necessity;
- monitoring general business and safety practices.

The TRA may also assess a fee based on a utility's gross receipts from intrastate commerce.[72] The Consumer Advocate Division, within the Attorney General's office, acts on behalf of Tennessee consumers in proceedings before the TRA.[73]

Federal Energy Regulatory Commission (FERC) regulation and jurisdiction is similar to that of the TRA on a national level. FERC is an independent regulatory agency within the Department of Energy that regulates the transmission and wholesale sales of electricity in interstate commerce, and FERC approves rates for private utilities.[74]

Private utilities self-regulate as well, to a certain extent, with respect to reliability. According to the U.S. Department of Energy, a 1965 blackout was the motivation behind government pressure on the utility industry either to be subject to increased regulation or to improve operations and reliability on its own. Subsequently, utilities formed a group called the North American Electric Reliability Council.[75] The North American Electric Reliability Council sets "reliability standards for interconnected electric transmission system operations." TVA is a member of the Southeastern Electric Reliability Council, a regional council of the North American Electric Reliability Council.[76]

Significant regulatory changes may be needed in the event that Congress substantially restructures TVA and Tennessee restructures its electric utility industry. Currently,

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[69] Tennessee Valley Electric System Advisory Committee, p. 5.
[70] *Tennessee Code Annotated*, § 65-4-103.
[71] 551 S.W.2d 315 (Tenn).
[72] *Tennessee Code Annotated* § 65-4-303.
[73] *Tennessee Code Annotated* § 65-4-118.
[74] Federal Energy Regulatory Commission, www.ferc.fed.us/electric/electric.htm.
[75] U.S. Department of Energy, Energy Information Administration, *Changing Structure of the Electric Power Industry: An Update*, December 1996, p. 65.
[76] North American Electric Reliability Council, www.nerc.com/regional/serc.html.

regulation of the electric industry in Tennessee is limited to the TRA's regulation of few private utilities that do business in the state, accounting for only two percent of Tennessee's electricity sales and even less of its generation. The TRA regulates the rates these three utilities can charge based on their costs of providing that power. All other regulation is handled by TVA, which regulates its own generation and transmission as well as its distributors' rates. The rates are also subject to the approval of the municipal and cooperative distributors' governing boards.

In a competitive market, government will have little control over the rates charged by generators. Regulation of wholesale electricity prices based on costs is seen as a disincentive for utilities to lower production costs.[77] Therefore, the state's role with respect to generation will be limited to taxation and environmental or economic development programs. With respect to electric distribution, regulation will be necessary to protect consumers and producers from abuse of monopolistic power by distributors, such as charging fair rental rates for use of the distribution infrastructure. Because distribution has been under the control of local municipal and cooperative distributors, with some TVA oversight, the TRA or some other agency would take on significant additional responsibilities in a market with retail competition.

Distribution is currently regulated by TVA and at the local level by the governing boards of the municipal and rural cooperative utilities. As stated previously, the TVA Act allows the agency to regulate the rates and universal service requirements of both municipal electric systems and rural cooperatives.[78] All other business activities are monitored by the cooperative or municipal board or by the local government that owns the utility (in the case of municipals). Distributors are "owned" by their customers in the sense that most decisions must be approved by a citizen board that consists of ratepayers or individuals appointed by the local government.[79]

If TVA's status changes to allow wholesale competition inside the fence, but Tennessee does not move to retail competition, then no significant changes are anticipated within the Tennessee Regulatory Authority. As is currently the case, local governing bodies would regulate the expenditures and other general business practices of municipal systems and cooperatives, unless the local distribution system were sold to a privately-owned utility. Under that scenario, the TRA would step in and regulate the system as it does currently.

If Tennessee moves to retail competition, then the state's regulatory responsibilities would most likely include regulation of distribution and marketing, substantially increasing both the scale and scope of the state's involvement in electric industry regulation. Tennessee could potentially go from regulating the business practices of a few utilities serving approximately 38,000 customers to regulating distribution and marketing of electricity to as many as four million customers throughout the state. Assuming the TRA would be the agency chosen to undertake these regulatory activities, the Tennessee Electric System Advisory Committee report indicates that the TRA may need additional funding and technical expertise to handle the increased responsibilities.[80]

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[77] Brennan et al., p. 5.
[78] 16 USC Sec. 831i.
[79] Information from interviews with Bill Moss, Executive Director of the Tennessee Municipal Electric Power Association and Tom Purkey, Executive Director of the Tennessee Electric Cooperative Association.
[80] Tennessee Electric System Advisory Committee, p. 29.

Federal regulation of transmission by FERC is seen by nearly all interested parties, from investor-owned utilities to public power advocates, as the best way to ensure fair competition, open access, lower costs, and reliability. Members of the Tennessee Electric System Advisory Committee agreed that all entities transmitting power should be subject to FERC jurisdiction.[81] Transmission should be regulated because it continues to be a natural monopoly. The structure of a transmission system is such that one firm can provide service more efficiently than several firms. Furthermore, antitrust concerns warrant regulation of transmission to guarantee that the owners of the transmission do not advantage one generator over another.[82]

Industrial Organization

The separation of governance and/or ownership, or "unbundling," of the three production stages (generation, transmission, distribution) may be the best way to reduce the risk of market power abuses. Vertical integration occurs when more than one stage of production is performed or owned (at least partly) by a single entity. Unbundling requires such an entity to separate into multiple entities, each carrying out only one production stage. An example would be the creation of separate TVA transmission and generation companies. There are at least three degrees of unbundling. Functional unbundling requires only that integrated companies create separate divisions for separate production stages; corporate unbundling requires the creation of separate corporations for each stage; and vertical divestiture requires that one utility maintain a financial interest in only one production stage. Vertical divestiture is the most complete form of unbundling and probably the most effective for reducing such risks. In Order 888, FERC views functional unbundling as one of the essential measures to ensure open transmission access.[83]

Even in a competitive industry, transmission will remain a regulated operation. With competing generators, measures must be taken to ensure the reliability of and open access to the transmission network. Although the future of TVA's generation and transmission assets is uncertain, the state should be prepared with a model that will ensure a fair and functioning market. Two options for transmission structure, independent system operators and transmission companies, can counteract the effects of vertical market power by making the middle stage – transmission – independent of generation and distribution. Independent and open access to the transmission system is necessary for competition to work, and the state can require that any utility serving Tennessee must belong to an independent transmission network.

An independent system operator is generally conceived of as a nonprofit corporation governed by a board with no interest in or affiliation with member utilities. It controls and thus maintains open access to the system. The development of an independent system operator, however, is a time-sensitive and difficult process. FERC has jurisdiction over the transmission system, and member utilities must file and receive its approval prior to operating. Two large independent system operators are currently under development in the Midwest and Northeast. Both have experienced delays, particularly in resolving members' concerns with regard to competitive

[81] Ibid., p. 11.
[82] Brennan et al., p. 66.
[83] 18 CFR 35 (FERC Order 888), pp. 58-59; Lackey, p. 19.

information.[84] In addition, critics worry that since independent system operators have no profit motive, they "will not be sufficiently motivated to make economic decisions."[85]

Regional transmission companies require complete transfer of ownership to an independent, private, limited-liability company that owns transmission facilities and plans transmission load and timing. Rates would be regulated by FERC. A transmission company owning the transmission facilities of more than one utility is also known as a grid company (called a "gridco" in industry jargon).[86] Transmission companies and grid companies are newer concepts, and critics claim that the relative level of experience with independent system operators indicates that a new process might be imprudent and could slow the deregulation process. Concerns exist with any form of independent transmission, whether an independent system operator, transmission company, or grid company. The physics of electricity dictate that power will flow through the transmission network wherever the capacity is available, at the point of least resistance. The industry may need to develop a real-time, flow-based approach to pricing before true independent transmission can become a reality. FERC is investigating the development of such an approach.[87]

Several models could facilitate power transactions in a restructured market. Retail competition seeks to lessen the regulatory restraints on generation facilities. Other states have introduced three alternatives to the current regulation that would help to achieve a functioning market and still maintain reliable and low-cost service. Those models include power pools/power exchanges, bilateral contracts, and a hybrid model, combining both the bilateral contracts and the power pool/power exchange approaches. The combination of a power pool and power exchange appears to be the most desirable model in other southern states.

The power pool/power exchange model (also referred to as a "poolco") can be either a voluntary or mandatory pool of power generators through which electricity is sold. An administrator with no generation or transmission interest aggregates power supplies, establishes bidding procedures, and facilitates the sale of power to distribution systems, power marketers, and final consumers. The power pool and power exchange would work in conjunction with an independent system operator or regional transmission company.[88] Because this approach provides equal access to the power supply at competitive prices, it ensures that all providers contribute to reliability and can allow for diversity in the electricity needs of different classes. Critics of the power pool/power exchange approach argue that it is costly to develop and may not be as economically efficient as an open market.[89]

A second option for generation structure is the bilateral contracts model, in which generators, marketers, and consumers buy and sell power on the open market. This model follows the

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[84] Commonwealth of Virginia, State Corporation Commission, *Draft Working Model for Restructuring the Electric Utility Industry in Virginia*, November 1997, p. 28.
[85] Lackey, p. 21.
[86] M. Douglas Dunn, "Transcos: The Key to Open Access?" *Public Power*, September-October 1998, p. 8.
[87] Bruce Radford, "Electric Transmission: An Overview." *Public Utilities Fortnightly*, January 1996, p. 32.
[88] Mississippi Public Service Commission, *Revised Proposed Transition Plan for Retail Competition in the Electric Industry*, June 1998, p. 8.
[89] Virginia State Corporation Commission, p 35.

economic principal that market power works to keep prices lower and ensure reliability.[90] Again, open access to an independent transmission entity is necessary. The primary advantage of a bilateral contracts model is that it allows purchasers to bargain for the lowest price. However, small consumers may not have the same bargaining power as large ones. This model would place a greater responsibility on distributors or marketers to aggregate interested consumers and on government or industry to implement consumer education programs.

The third model is the hybrid, which combines the power pool/power exchange and bilateral contracts models. The pool would serve generators, wholesale customers, and retail customers who choose not to purchase power in the open market. The independent transmission entity, whether independent system operator or transmission company, would serve strictly as a grid operator.[91] The hybrid model has been criticized for two reasons: high initial costs and some disadvantages for smaller consumers. Most states oppose the costs associated with a power pool when another option exists. A concern similar to that of the bilateral contracts model is that smaller consumers could be at a disadvantage, in that large customers may benefit relatively more from either the pool or bilateral contracts. That would leave the other option with limited generation supplies at higher prices.[92]

Other Issues for Consideration

Reliability

"Reliability for an electric power system, is, most simply, the extent to which consumers can obtain electricity from the system when and in the amount they want."[93] As important to consumers as the price is the reliability of the electric system. Factories can lose hundreds of thousands of dollars from power outages, and residential customers face discomfort, inconveniences, and possibly health dangers when refrigeration and air conditioning or heating systems cannot function.

Reliability has two facets: adequacy and security. Adequacy means that the transmission and generation facilities have the capacity to supply consumer demands. Security is a system's ability to deliver uninterrupted power to customers. These facets are directly related to both the capacity and consistency of electric generation and transmission systems.

A competitive electricity market may reduce the costs currently associated with maintaining an adequate electricity supply. Current regulation forces adequacy. Although a competitive market may bring different incentives, system adequacy likely will not suffer. With competition, trade in electricity provides the additional and flexible supply source, thereby enhancing the physical reliability of the system without requiring as much investment in excess capacity. What will change is the way it is achieved. Presently, excess generation capacity is

[90] Mississippi Public Service Commission, p. 9.
[91] Ibid.
[92] Larry Ruff, "An Efficient, Competitive Electricity Industry: Can the Vision Become Reality," *The Electricity Journal*, January/February 1997, p. 16.
[93] U.S. Department of Energy, Energy Information Administration, *Performance Issues for a Changing Electric Power Industry*, January 1995, p. 1.

maintained by each utility or region as a reserve in case of power shortage. In a competitive market, trade in electricity provides the additional and flexible supply source, thereby enhancing the physical reliability of the system without requiring as much investment in excess capacity. As long as transmission barriers do not impede trade, the system should be reliable from an adequacy standpoint.

However, oversight of the system's security, such as stability or voltage frequency, may suffer if sufficient institutional changes are not made. Governance of those portions of the industry that remain regulated should include some regulation of system security. To what degree "ancillary" services – those generation and transmission functions that are necessary to maintain system reliability – are regulated or left to the competitive market is a question requiring further consideration.[94]

A publication of the Electricity Consumers Research Council outlines three viable innovations that would help policy makers achieve reliability goals in a competitive market. These measures focus on pricing services based on actual generator performance and customer usage rather than an assumed or average performance, as is currently the case. Thus, the recommendations are based on rational, economic incentives.[95]

- *Reserves may be priced based on outage rates rather than average cost.* An independent system operator could maintain some level of excess generation reserves or the ability to purchase those reserves from an appropriately located generator.[96] The cost of maintaining those reserves would be charged to generators according to their outage rates. Generators with higher outage rates would pay a higher proportion of the cost of guarding against outages.
- *Charges for responding to minute-by-minute load fluctuations should be based on the volatility of electricity consumption rather than the average consumption.* Utilities now file tariffs with FERC based on customers' average hourly load, and generators are paid regardless of the efficiency with which they respond to volatility of that load. A pricing system that reflects actual customer usage and generator performance would be more efficient and encourage more reliable service.
- *Real-time pricing induces efficient supply and demand responses that reduce the required system capacity.* High prices encourage consumers to use less electricity and send signals to producers regarding when and how much capacity is necessary. "Thus, economics can substitute for engineering to maintain real-time reliability when demand would otherwise exceed supply."[97]

Various models for structure and governance of transmission and transactions could facilitate an efficiently functioning market and permit legislators to implement transmission-related public policy objectives. Transmission coordination is very important to

[94] Eric Hirst and Brendan Kirby, "Restructuring – The *Devil* Is in the Details," *The Electricity Journal*, December, 1995.
[95] Eric Hirst, "Competition Can Enhance Bulk-Power Reliability," *Profiles on Electricity Issues*, No. 19, June, 1997.
[96] There are two such types of reserves: "spinning reserves" and supplemental reserves," which have traditionally been regulated to ensure an adequate supply in case of outages.
[97] Hirst, p. 10.

maintaining system security. The Southeastern Electric Reliability Council's[98] reliability projections raise concerns as to who operates and invests in transmission infrastructure in a restructured electric industry. There are a number of alternatives for structuring transmission, including public, private nonprofit, and private for-profit transmission companies. (See section on *Industrial Organization*). Few if any of these alternatives would be viable without some degree of regulation to ensure universal, nondiscriminatory access to all suppliers, fair rates of return, and system security.[99] For example, Wisconsin is trying another approach and plans to set up an independent company called TRANSCO (industry jargon for "transmission company") that is expected to ease summer-time power shortages by coordinating regional transmission.[100]

Universal Service

Whereas reliability is the adequate and secure flow of electricity, and is determined both by strategic behavioral controls and the level of investment in physical infrastructure, universal service concerns relate primarily to profit-driven behavior, rather than the physical features of the system. Because retail competition means selling power directly to individuals, among universal service concerns is the question of whether utilities may not offer service to high-cost customers because of insufficient profit margins.

As long as distributors' service areas are fixed, retail competition need not inhibit universal service. In a market with retail competition, the Tennessee Regulatory Authority or some other appropriate regulatory entity may be necessary to ensure that all residents of a distributors' service area have access to the distribution lines, provided that customers choosing to live in hard-to-reach areas supplement the cost of reaching their property (as is presently the case). If there is concern that marketing efforts will concentrate more on densely populated areas, public information campaigns or requirements that companies selling in Tennessee market to all regions may be solutions. Also, distributors may act as aggregators within their fixed service areas. Wholesale competition would imply this, in that a distributor would bargain for service for each customer in their entire area, and retail competition would also potentially allow aggregation by distributors, providing that there are safeguards against anticompetitive practices by the distributors toward other potential aggregators.

A variety of public policy tools can enhance market access to economically disadvantaged consumers. Consumer advocacy groups have expressed concern that utilities will choose not to serve low-income customers because of the cost of reaching them.[101] The General Assembly can address this concern by limiting distributors' ability to price-discriminate, or to charge different customers different rates for distribution services. State and local governments can also provide

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[98] The Southeastern Electric Reliability Council member systems are: Southern Company, TVA, Virginia-Carolina Area, and Entergy. It is a subdivision of the North American Electric Reliability Council.

[99] North American Electric Reliability Council. *Reliability Assessment, 1998-2007: The Reliability of Bulk Electric Systems in North America.* September, 1998.

[100] Jeff Mayers, "Wisconsin Gives Electric Deregulation Debate Different Twist," www.stateline.org, June 28, 1999. The concept of transmission company is reviewed in M. Douglas Dunn and Mark Williams, "TRANSCOS: The Key To Open Access?" *Public Power*, September-October, 1998, pp. 8-11.

[101] American Farm Bureau, "Electricity Deregulation to Impact Rural U.S.," *Farm Bureau News* 77:4 (January 26, 1998); National Rural Electric Cooperative Association, "On The Buying Side of the Meter: A Consumer View of Electricity Deregulation," www.nreca.org/news/consumerview_position.html.

vouchers or other similar targeted assistance to individuals for use in purchasing electricity. Furthermore, municipal and cooperative distributors alike express a strong commitment to maintaining universal service for all customers in their service areas, making many of these options for guaranteeing universal service politically, as well as economically, feasible.[102]

Economic Development

Competition in the electric industry should not adversely affect Tennessee's ability to recruit business or its position among competing Southeastern states. Although electricity cost is among the considerations in the location decisions of many industries, research has shown that it is not generally among the top factors in manufacturers' location decision.[103] In one study, labor and market access ranked first, followed by land and employees' quality of life, and electricity cost fell below these. Furthermore, although TVA's mission and past record include a focus on regional economic development, large private power companies have also engaged in economic development activities in their regions and would likely continue to have both public relations and profit motives for doing so. Since TVA's electric rates for industrial customers are close to the average for the Southeast and subsidize residential rates, industrial customers may face lower power costs in a competitive market than is currently the case.

Public Health and Environmental Concerns

Without a greater state role in air quality control, competition is not expected to reduce Tennessee's current air quality problems and may adversely affect health and environmental quality in the region. TVA's coal-burning plants are among the oldest and "dirtiest" in the country, and air pollution in Tennessee is considered very high and perceived to be getting worse.[104] Although the Tennessee Department of Environment and Conservation has a pollution permitting procedure, air quality in the state would benefit from stronger regulation or other pollution reduction programs. The Environmental Protection Agency recently recognized the need for action in Tennessee and is advocating for such action through legal channels.[105]

The main reasons for concern over public health and the environment as a result of moving to a competitive electric industry are based on two expectations:[106]

1. Competition is generally expected to drive down prices, leading to greater consumption of electricity. Although in the long run public policies and competitive forces may improve the efficiency – including environmental performance – of coal-fired power plants, in the short run more consumption means more pollution.

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[102] This point was repeated throughout meetings with municipal distributors, rural cooperatives, and their statewide associations.

[103] F.J. Calzonetti and Robert T. Walker, "Factors Affecting Industrial Location Decisions: A Survey Approach." In Henry W. Herzog, Jr. and Alan M. Schlottmann, eds. *Industry Location and Public Policy*. Knoxville, TN: The University of Tennessee Press, 1991, pp. 221-240.

[104] Tennessee Valley Energy Reform Coalition. *Clearing the Air: Getting the Dirt on TVA's Coal-fired Power Plants*. Tennessee Clean Air Task Force. October, 1998; Anne Paine, "Task Force Report Pegs Pollution on TVA Coal Power," *The Tennessean*, October 14, 1998; Sam Venable, "High 'Honor' is a Low Mark for Great Smokies," *Knoxville News-Sentinel*, April 23, 1999.

[105] Randy Fabi, U.S. Sues Coal Power Plants over Pollution, *Reuters*, November 4, 1999.

[106] Karen Palmer and Dallas Burtraw, *Electricity Restructuring and Regional Air Pollution*, Resources for the Future. July, 1996.

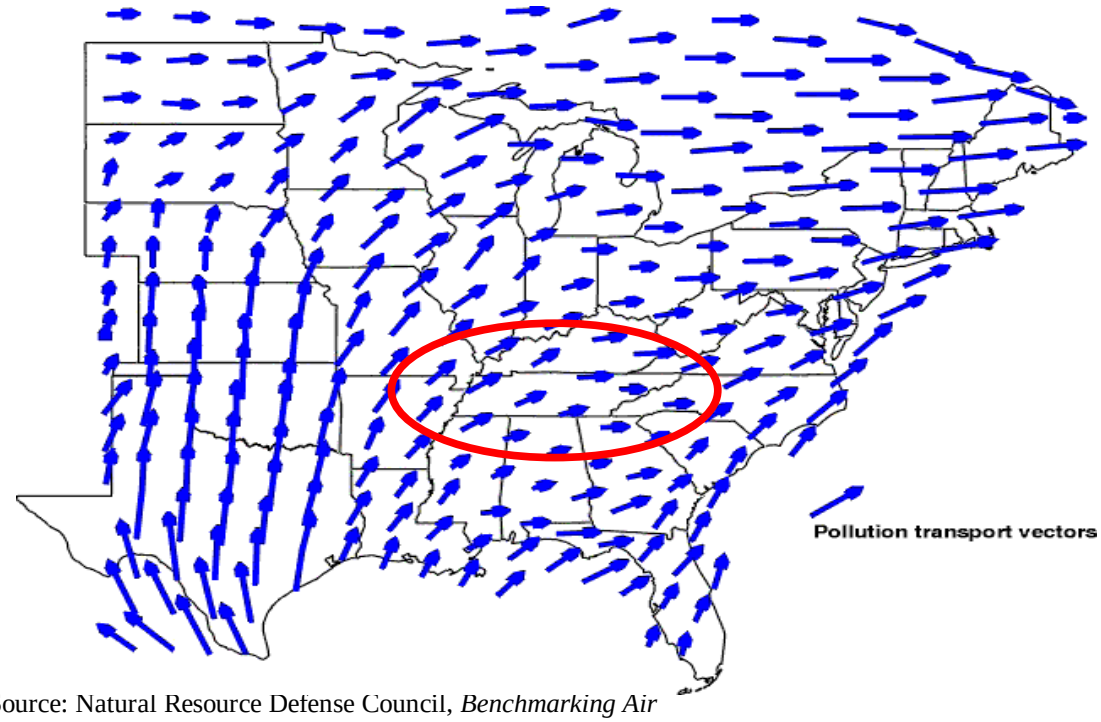
2. Competition may encourage producers to increase the output of older, coal-fired generators which have low input costs. The removal of electricity price regulation without a counter-balance of environmental standards would drive producers with unused coal-fired capacity to utilize that cheap power source to increase profits. Because TVA's coal-burning plants are among the oldest and most polluting in the country, this concern is relevant to Tennessee.

Coal-fired generation of electricity produces a number of waste by-products that are sources of public health and environmental damage. These by-products include particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NO_x), and greenhouse gases, especially carbon dioxide (CO_2). The shares of total U.S. emissions of these four pollutants contributed by the electricity industry in 1994 were 0.5 percent (PM), 70.4 percent (SO_2), 33.0 percent (NO_x), and 35.0 percent (CO_2). Problems attributed to these and related pollutants include: lung inflammation and premature lung aging; premature mortality; water pollution in the forms of acid deposition (acid rain), high nitrate levels in drinking water, and eutrophication; ozone depletion and global warming; decreased visibility; formation of other toxic nitrogen compounds.

The tables in Appendix G show that TVA's fossil plants (i.e., coal-burning generators) in 1996 ranked high among U.S. utilities in terms of the pounds per megawatt-hour of pollutants they produce. TVA's fossil plants in that year were first in NO_x emissions, tenth in SO_2 emissions, and thirty-sixth in CO_2 emissions.

The effects of air pollution generally are not uniform. Rather, they tend to have localized impacts, concentrating in urban centers and areas with particular topographical and meteorological conditions. The following diagram offers some insight into how this air pollution travels eastward to create high concentrations in East Tennessee, particularly in the Great Smokey Mountains National Park, and in Middle Tennessee west of the Cumberland Plateau.

Predicted Movement of Air Pollution in the Southeastern



Source: Natural Resource Defense Council, *Benchmarking Air Emissions of Electric Utility Generators in the U.S.*, 1996.

Public utility commissions have played a role in pollution regulation in some states. Within the eight states bordering Tennessee, the record on regulating pollution produced by electricity generation is mixed. According to the U.S. Department of Energy, Alabama's public utility commission has neither taken significant action nor exhibited an awareness of the costs imposed by pollution. Commissions in Georgia, Missouri, and North Carolina have required some degree of computation of the added social costs pollution imposes, but none has gone as far as other U.S. states (California, Massachusetts, Minnesota, and New York, for example) in actually requiring utilities to pay those costs. The remainder of Tennessee's border states have exhibited some awareness of the problems pollution creates but have taken no action.[107] The Tennessee Department of Environment and Conservation sells pollution permits to TVA generation facilities, but the Tennessee Regulatory Authority has no involvement in the regulation of generation, and therefore of pollution. Permits are sold based on a per-unit of emissions basis, but permit costs may not reflect the social costs of the emissions.

According to the American Lung Association, among Tennessee and its eight border states, Tennessee has the highest percentage of its population – over half – in counties projected to be in nonattainment with new EPA air quality standards for ozone and particulate matter.[108] Likewise, of the 50 U.S. metropolitan statistical areas with the highest average concentrations of particulate matter (called the PM-10 concentration) from 1990 to 1994, Chattanooga, Knoxville, and

[107] U.S. Department of Energy, Energy Information Administration, *Electricity Generation and Environmental Externalities: Case Studies*, DOE/EIA-0598, September, 1995.
[108] American Lung Association, *Lungs At Risk: State by State Charts of Populations at Risk*, www.lungusa.org/pub/states/map.html.

Nashville ranked 20th, 34th, and 35th, respectively. Tennessee's border states contained six of the other 47 metropolitan statistical areas among the top 50 highest average PM-10 concentrations over that five-year period.[109]

Recent national and international focus on fossil emissions, reflected in the EPA's "NO_x SIP call" and in the 1997 Kyoto agreement, has created some degree of anticipation and uncertainty about future fossil fuel emissions targets in the United States. The standards set at Kyoto and by the EPA require substantial reductions in emissions, and these reductions may require greater efficiency in existing plants, a shift from coal to natural gas, further investment in gas-fired and possibly nuclear generation, and demand-side management programs. Such measures are costly and require political and regulatory stamina to effectively implement. [110]

The state could use a number of methods to protect and improve air quality, including:

1. higher taxes (or fees) on the output of specific pollutants;
2. subsidies for pollution abatement measures;
3. public education regarding the potential negative effects of fossil emissions, coupled with information on polluters in Tennessee and surrounding states;
4. tradable pollution permits;
5. mandated reductions in the emissions of specific pollutants.

[109] Deborah Sheiman Shprentz, *Breath-taking: Premature Mortality Due to Particulate Air Pollution in 239 American Cities*, Natural Resource Defense Council, May, 1996.
[110] 40 CFR 51 and 40 CFR 52; William L. Thomas, "The Kyoto Protocol: History, Facts, Figures and Projections.," *Public Utilities Fortnightly*, April 15, 1999, pp. 48-49.

Alternatives and Recommendations

As decisions that affect Tennesseans continue to be made at the national and regional levels, the following may be appropriate considerations for the Tennessee General Assembly:

The General Assembly may wish to continue deliberations through the Joint Study Committee and prepare for whatever action may come from Congress. If passed, House Joint Resolution 89 (101st General Assembly) would extend the Joint Study Committee on Electric Utility Deregulation until February, 2001. Ongoing study of a variety of issues is a necessary part of that preparation.

The General Assembly may wish to define and actively promote Tennessee's interests in Congress with regard to the future of TVA and the impacts of national restructuring legislation on Tennessee. No one representing the state legislature or the Tennessee Regulatory Authority was included in the Tennessee Valley Electric System Advisory Committee. Tennessee's interests should be represented in such policy-influencing bodies.

Continuing deliberations concerning the future of Tennessee's electric industry should include broad education of and input from those ultimately affected, the consumers. Issues relating to consumer choice are of economic importance to individual Tennesseans. For example, the consequences of defining and addressing stranded costs or whether to mandate rate reductions will ultimately be borne by consumers, the overwhelming majority of whom are Tennessee residences and businesses. Furthermore, Tennessee is in the unique position of having primarily one provider statewide. As a result, public education about the electric industry and the practical implications of consumer choice is absolutely necessary to any successful restructuring.

In the event that the Tennessee General Assembly chooses to move to a competitive electric industry in Tennessee, then the following recommendations would apply:

The General Assembly may wish to move slowly in allowing competition, possibly following the examples of Virginia and Pennsylvania in first pursuing pilot projects. Tennessee is a relative latecomer among states considering electric restructuring. Though it is unclear when and how Congress will act with respect to TVA, when Tennessee does have the opportunity to pursue restructuring it may benefit both from observation of other states' experiences as well as experimentation with competition on a limited basis before extending restructuring throughout the state.

Full retail competition is probably the preferable approach. In other words, if choice is to be extended, economic efficiency dictates that it should probably be extended to individual consumers. Existing distributors may have the option to compete with others marketing electric power and other services, and in that case the General Assembly will need to restructure taxation and regulation to sufficiently level the playing field among the different participants in a retail competitive market.

The General Assembly may wish to require the unbundling of generation and transmission. There is much support for this nationwide as the best way to promote competition by making transmission a noncompetitive and regulated service. Further research and discussion are necessary to determine the degree of unbundling that is appropriate for Tennessee.

In the formative stages of a competitive market, and given the option, the General Assembly may wish to allow utilities to recover only "prudently incurred" stranded costs. Federal legislation may involve the definition of TVA's stranded costs by the Federal Energy Regulatory Commission and/or other federal agencies. If Congress does not take such action, then it may be the responsibility of the Tennessee Regulatory Authority, the Comptroller of the Treasury, and other state agencies to define those costs.

The General Assembly may wish to consider following other states' examples of mandating a rate reduction, rate cap, or other price-reduction mechanism in restructuring legislation. For example, California legislators mandated a ten percent rate reduction, and Texas required a five percent reduction.

The General Assembly may wish to consider point-of-sale (consumption) taxes, similar to those in Virginia, Illinois, and many other states, to replace the gross receipts taxes and property taxes paid by generators. There are a number of determinations and clarifications that must be made in order to properly structure an electricity consumption tax:

- The tax should be priced per kilowatt-hour rather than per dollar.
- The tax may be levied on the distributor as a tax per unit sold or on the consumer as a tax per unit consumed.
- The General Assembly would have to weigh its revenue goals with its public policy goals in deciding whether to maintain existing exemptions.
- Assuming some degree of unbundling, the General Assembly would decide whether to make the separate utility activities separate line items on an electricity bill, and the statute creating an electricity consumption tax should define the subset of these activities that would be subject to the tax.

The General Assembly may wish to require utilities selling in Tennessee to establish nexus in the state and to require utilities doing in-state business to agree to abide by conditions that will ensure effective taxation, universal service, and other public policy goals. Questions about the state's ability to tax out-of-state utilities selling to in-state customers have been resolved elsewhere by requiring utilities to establish offices within the state (e.g., New Jersey) and by requiring any utility doing business in the state to agree to abide by the same rules as in-state utilities, including being subject to taxation (e.g., Pennsylvania).

The General Assembly may wish to participate in or develop an independent system operator or some other independent transmission company to maintain open transmission access and increased system reliability. For example, American Electric Power recently joined the Midwest Independent System Operator, and utilities around the country are investigating the best method for open transmission access. This would obviously require the participation of TVA, which, if required to separate generation from transmission assets, might be suited for the role of a regional transmission company.

The General Assembly may wish to consider keeping the electric distribution system Tennessee currently has, with fixed distribution service areas, while allowing retail competition. Universal service concerns can be effectively addressed within this framework, whether through subsidies to high-cost customers, taxes on low-cost customers, or regulations.

The General Assembly may wish to consider measures for reducing public health and environmental risks from electric generation. Pollution taxes, abatement subsidies, tradable pollution permits, demand-side management programs, public education efforts, and publicizing polluters' behavior are all means of accomplishing these goals. Many of these measures do not necessarily have to wait until any industry restructuring takes place.

Questions for Future Investigation

Because of the uncertainty of TVA's future and of the unfolding experiences of other states further along in the restructuring process, some of the conclusions in this report are, by necessity, based on speculative assumptions. The Office of Research has attempted to identify some of the areas in which more work is necessary to determine how the various aspects of restructuring should develop in Tennessee and how they will affect ratepayers and taxpayers.

1. What are the efficiency and equity consequences of different means of maintaining universal service: direct subsidies, price gap maximums (indirect subsidies), reservation of cheap power sources for certain consumers, regulation of sellers' or distributors' prices?

2. Taxation of the electric industry may take many forms. The following are some tax-related questions for future research.
   a. How would state and local tax revenues change under different tax systems and industry structures? For example, what would be the effects of replacing tax-equivalent payments with consumption taxes on some subset of the consumer's electricity bill?
   b. Should any tax changes lower, maintain, or increase the overall level of taxes? What consumption tax rates, for example, would accomplish such a goal? Should measures be developed to address the impacts on particular groups of consumers, such as to alleviate revenue losses for some consumers even when the system as a whole is revenue neutral?
   c. Should the tax system promote competitive neutrality, and if so how? In other words, to what degree do different taxes present a level taxation playing field?
   d. How do the different electric utility tax options compare with respect to stability, elasticity, and compliance and administration costs?
   e. What are other states' experiences with consumption, gross receipts, and other taxes in a competitive market?
   f. Does it make sense to structure an electric industry tax system that is more or less in step with neighboring states, or should the focus be on national rather than regional trends?

3. What are the economic and environmental consequences of different approaches to pollution reduction: output taxes or fees, input taxes, abatement subsidies, tradable permits, demand-side management programs, public education, publicity, quotas and fines?

4. System operation, transmission, and distribution will continue to be regulated in a restructured industry.
   a. What should be the criteria used by regulators for evaluating the performance of these three phases?
   b. How should incentives and responsibilities be allocated among them?

c. To what degree should “ancillary” services –generation and transmission functions that are necessary to maintain system reliability – be regulated or left to a competitive market?

5. In a market with retail competition, many new companies (marketers, brokers, electricity-related services) will emerge. Should the state regulate these new activities, and if so, how? What type of licensing is appropriate?

6. What kinds of public information and education measures should be implemented to begin to prepare for retail competition? What measures have been successful in other states, and how might those or other programs be implemented in Tennessee? What are the costs of these programs, and which populations do they reach?

7. Enron’s Haywood County generation facility is being followed by other exempt wholesale generators that will act as regional electricity merchants. More research may be needed to determine whether and how regulation and taxation should account for these new facilities. How will the appearance of such generators in Tennessee affect TVA’s stranded costs, and thus the potential for a competitive market? How will restructuring affect the taxes such companies pay to state and local governments?

Appendices

Appendix A: Interviews Conducted for This Study

American Electric Power: Dan Carson, Isaac Webb, and Mark Lawrence.

Berenson Minella: Chris Picotte.

Center for Energy Studies, Louisiana State University: David Dismukes and Allan Pulsipher.

Chattanooga Electric Power Board: Harold DePriest.

Citizens for Pennsylvania's Future: John Hangar.

Consumer Federation of America: Mark Cooper.

Jackson Utility Division: John Williams.

Knoxville Utilities Board: Susan Edwards.

Nashville Electric Service: Matthew Cordero, Elaine Robinson, and Gene Ward.

National Regulatory Research Institute: Kenneth Rose.

Oak Ridge National Laboratory: Eric Hirst.

Owen School of Business, Vanderbilt University: Luke Froeb.

Strang, Fletcher, Carriger, Walker, Hodge, and Smith, PLLC: Carlos Smith and Mark Smith.

Tennessee Comptroller of the Treasury, Office of State Assessed Properties: Gary Harris.

Tennessee Department of Economic and Community Development: Alex Fischer and Cynthia Oliphant.

Tennessee Electric Cooperative Association: Walter Haynes and Tom Purkey.

Tennessee House of Representatives: Matthew Kisber.

Tennessee Municipal Electric Power Association: Bill Moss.

Tennessee Power Company: Mike Knaupf.

Tennessee Regulatory Authority: Glynn Blanton, Chris Klein, and Hal Novak.

Tennessee Senate: Ron Ramsey.

Tennessee Valley Authority: Terry Boston, Steve Grace, Andy Holmes, Jimmy Johnston, Jim McCarter, Ian McLeod, Lynn Morehous, Larry Taylor, Donna Terzak, and Steve Whitley.

Tennessee Valley Energy Reform Coalition: Stephen Smith.

Tennessee Valley Public Power Association: Dick Crawford.

U.S. General Accounting Office: Don Neff.

Appendix B: Selected Tennessee Laws Relevant to Electric Utilities

Municipal utilities are exempt from taxation.
TCA § 7-34-116

Municipal electric utilities make payments in lieu of taxes amounting to 4 percent of average net revenue for the preceding 3 fiscal years.
TCA § 7-52-304

Public utilities must obtain a "certificate of public convenience and necessity" before constructing or operating lines or plants.
TCA § 65-4-201

No out of state electric company (company that "generates power at a point or points outside the state") may extend or construct transmission or distribution liens inside the state.
TCA § 65-4-208

The Tennessee Regulatory Authority fixes the rates of "public utilities," which (defined in TCA § 65-4-101) excludes all providers in Tennessee with the exception of investor-owned utilities.
TCA § 65-5-201

Universal service is required for local exchange telephone service in a competitive market.
TCA § 65-5-207

New cooperative plants are exempt from property taxation for four years.
TCA § 65-25-222(a)

Electric utilities pay a gross receipts tax of 3 percent of receipts derived from intra-state business within the state. Manufacturers or distributors of gas or natural gas pay 1.5 percent.
TCA § 67-4-405(a)(1) and (2)

Exempt wholesale generators and FERC certified wholesale power marketers are exempt from the gross receipts and natural gas taxes in TCA § 67-4-405(a)(1) and (2).
TCA § 67-4-405(b) and 67-4-406

Credits on the gross receipts tax are allowed for franchise and excise taxes paid.
TCA § 67-4-405(d)

The first $5,000 of distribution receipts are exempt.
TCA § 67-4-405(f)

Corporate franchise tax of 25 cents per 100 dollars of stock, surplus, or undivided profits applies to IOUs.
TCA § 67-4-903 and 67-4-904(a)

Property for pollution reduction is exempt from the franchise tax.
TCA § 67-4-906(a)(6)

Public utility real and tangible personal property are assessed for property tax purposes at 55 percent of value. Industrial and commercial real property is assessed at 40 percent of value, and industrial and commercial tangible personal property is assessed at 30 percent of value.
Art. II, section 28, Constitution
TCA § 67-5-801(a) and 67-5-1302(a)(1)

Comptroller is directed to assess electric light companies (among other utilities).
TCA § 67-5-1301(a)(9)

The property taxes paid by electric light companies and electric cooperatives are apportioned to the taxing district where the property is located.
TCA § 67-5-1325(d)

Utility poles, equipment in electrical plant, and pollution control equipment are exempt from sales and use taxes.
TCA § 67-6-102 (29), § 67-6-209(e), § 67-6-346

State sales tax of 6 percent applies to electricity sales.
TCA § 67-6-202(a)

Manufacturing sales are either exempt or pay a reduced rate of 1.5 percent sales tax on electricity.
TCA § 67-6-206(b)

Sales to municipals and cooperatives are exempt from taxation.
TCA § 67-6-332

Residential sales are exempt from taxation.
TCA § 67-6-334(a)

There are formulas for distributing TVA payments between state and local governments and among local governments.
TCA § 67-9-101 and 67-9-103

Corporate excise tax of 6 percent of net income applies to IOUs.
TCA § 76-4-806(a)

Appendix C: Difference between Residential Customers' Average Revenue and Commercial and Industrial Customers' Average Revenue, 1997 (cents per kWh)

States	Residential-Industrial Gap	Rank	Residential-Commercial Gap	Rank
Alabama	2.9	35	0.2	48
Alaska	3.8	17	1.9	6
Arizona	3.7	19	1.0	29
Arkansas	3.5	24	1.1	25
California	4.6	4	1.5	14
Colorado	3.2	28	1.7	9
Connecticut	4.3	10	1.8	7
Delaware	4.4	7	2.0	4
D.C.	3.5	24	0.5	41
Florida	2.9	35	1.4	17
Georgia	3.6	22	0.7	39
Hawaii	4.4	7	1.5	14
Idaho	2.5	46	0.9	35
Illinois	5.2	3	2.5	1
Indiana	3.1	31	1.0	29
Iowa	4.3	10	1.6	13
Kansas	3.0	33	1.2	22
Kentucky	2.7	41	0.4	46
Louisiana	3.2	28	0.5	41
Maine	6.4	2	2.4	2
Maryland	4.1	13	1.4	17
Massachusetts	2.8	39	1.3	19
Michigan	3.7	19	0.8	38
Minnesota	3.0	33	1.0	29
Mississippi	2.9	35	0.4	46
Missouri	2.6	44	1.1	25
Montana	3.1	31	0.6	40
Nebraska	2.7	41	1.0	29
Nevada	2.3	48	0.5	41
New Hampshire	4.6	4	2.3	3
New Jersey	4.0	14	1.7	9
New Mexico	4.5	6	1.1	25
New York	8.9	1	2.0	4
North Carolina	3.4	26	1.7	9
North Dakota	1.7	50	0.0	50
Ohio	4.4	7	1.0	29
Oklahoma	2.9	35	0.9	35
Oregon	2.4	47	0.5	41
Pennsylvania	4.0	14	1.5	14
Rhode Island	3.6	22	1.7	9
South Carolina	3.9	16	1.2	22
South Dakota	2.7	41	0.5	41
Tennessee	*1.7*	*50*	*-0.1*	*51*
Texas	3.7	19	1.1	25
Utah	3.4	26	1.2	22
Vermont	4.3	10	1.3	19
Virginia	3.8	17	1.8	7
Washington	2.3	48	0.2	48
West Virginia	2.6	44	0.8	37
Wisconsin	3.2	28	1.3	19
Wyoming	2.8	39	0.9	34
U.S.	**3.9**		**0.8**	

Source: Energy Information Administration, *Electgric Power Annual, 1997: Volume II*.

Appendix D: Average Revenue of Tennessee Municipal and Cooperative Distributors by Customer Class, 1997 (cents per kWh)

Distributer	Average Revenue			
	Residential	General Power 50 kW & Under	General Power Over 50 kW	All Sales
ALL TVA DISTRIBUTORS	*6.01*	*6.94*	*4.87*	*5.54*
ALL TVA MUNICIPALITIES	*5.87*	*6.66*	*4.81*	*5.38*
5 BIG TVA MUNICIPALS	*5.87*	*6.57*	*4.80*	*5.35*
OTHER TVA MUNICIPALS	*5.88*	*6.74*	*4.82*	*5.41*
ALL TVA COOPERATIVES	*6.23*	*7.61*	*5.07*	*5.94*
ALCOA	5.78	6.78	5.37	5.78
ATHENS	5.81	6.70	4.16	4.74
BENTON COUNTY	6.15	7.17	4.17	5.43
BOLIVAR	6.19	7.33	5.81	6.26
BRISTOL	5.43	6.20	4.35	5.02
BROWNSVILLE	5.58	6.23	4.62	5.03
CARROLL COUNTY	5.91	7.24	5.13	5.68
CHATTANOOGA	5.92	6.54	4.65	5.20
CLARKSVILLE	5.80	6.44	5.21	5.64
CLEVELAND	5.75	6.52	4.61	5.15
CLINTON	5.85	6.88	5.01	5.61
COLUMBIA	5.74	6.80	5.23	5.67
COOKEVILLE	6.03	6.68	5.23	5.60
COVINGTON	5.88	6.74	4.82	5.17
DAYTON	5.93	6.91	5.13	5.64
DICKSON	6.10	7.24	4.84	5.65
DYERSBURG	5.98	6.73	4.13	4.68
ELIZABETHTON	6.08	7.36	5.55	6.03
ERWIN	5.79	6.71	4.42	5.16
ETOWAH	5.86	6.81	3.82	4.81
FAYETTEVILLE	6.44	7.82	5.56	6.24
GALLATIN	5.37	5.98	4.08	4.52
GREENEVILLE	5.58	6.57	4.27	5.01
HARRIMAN	6.46	7.53	4.24	5.67
HUMBOLDT	5.45	6.14	4.77	5.03
JACKSON	5.96	6.62	4.62	5.13
JELLICO	6.57	7.59	6.47	6.66
JOHNSON CITY	5.66	6.49	5.04	5.47
KNOXVILLE	5.91	6.72	4.80	5.43
LAFOLLETTE	6.22	7.28	6.36	6.37
LAWRENCEBURG	6.10	7.20	4.75	5.57
LEBANON	5.79	6.35	4.89	5.30
LENOIR CITY	5.86	6.87	5.50	5.81
LEWISBURG	5.83	6.71	4.86	5.20
LEXINGTON	6.02	7.12	5.49	5.93
LOUDON	6.44	7.31	4.88	5.44
MARYVILLE	5.62	6.31	4.37	4.98
MCMINNVILLE	5.71	6.62	5.07	5.47
MEMPHIS	6.09	6.81	4.99	5.55
MILAN	5.88	6.91	5.37	5.72
MORRISTOWN	5.76	6.39	4.83	5.13

MOUNT PLEASANT	6.02	6.83	5.48	5.86
MURFREESBORO	5.65	6.16	4.91	5.27
NASHVILLE	5.76	6.45	4.72	5.25
NEWBERN	5.96	6.95	4.24	4.66
NEWPORT	6.35	7.63	4.71	5.71
OAK RIDGE	5.92	6.51	5.31	5.69
PARIS	5.61	6.56	4.87	5.45
PULASKI	6.02	7.07	4.47	5.17
RIPLEY	5.51	6.25	5.33	5.49
ROCKWOOD	6.28	7.35	4.78	5.77
SEVIER COUNTY	5.91	6.80	5.36	5.75
SHELBYVILLE	6.03	6.56	5.05	5.41
SMITHVILLE	5.79	6.61	5.10	5.40
SOMERVILLE	5.74	6.36	5.53	5.79
SPARTA	5.90	6.57	5.23	5.57
SPRINGFIELD	5.93	6.73	5.28	5.67
SWEETWATER	5.76	6.69	5.22	5.63
TRENTON	5.76	6.40	5.09	5.48
TULLAHOMA	5.67	6.31	5.19	5.57
UNION CITY	5.43	5.98	4.02	4.39
WEAKLEY COUNTY	5.70	6.65	5.31	5.66
WINCHESTER	5.90	6.68	5.37	5.71
All Tennessee Municipals	***5.90***	***6.67***	***4.83***	***5.40***
APPALACHIAN EC	6.00	7.51	5.37	5.95
CANEY FORK EC	5.90	7.40	5.43	5.89
CHICKASAW EC	5.58	7.00	4.76	5.35
CUMBERLAND EMC	6.08	7.39	4.76	5.81
DUCK RIVER EC	6.29	7.23	5.72	6.23
FORKED DEER EC	6.09	8.54	4.47	5.78
FORT LOUDON EC	6.46	7.79	5.42	6.39
GIBSON EMC	6.12	7.30	5.54	6.08
HOLSTON EC	6.01	7.41	4.29	5.27
MERIWETHER LEWIS EC	6.50	7.89	5.37	6.17
TENNESSEE EMC	5.67	6.55	4.50	5.27
MOUNTAIN EC	6.29	7.46	4.46	5.69
PICKWICK EC	5.89	7.34	5.57	5.95
PLATEAU EC	6.90	8.17	6.59	6.93
VALLEY EC	6.10	7.12	5.14	5.85
SOUTHWEST TENNESSEE EMC	6.23	7.75	5.52	6.21
TENNESSEE VALLEY EC	6.25	7.42	6.03	6.33
TRI-COUNTY EMC	6.15	7.54	5.21	5.91
UPPER CUMBERLAND EMC	6.25	7.60	5.22	6.05
VOLUNTEER EC	6.16	7.41	5.09	6.02
All Tennessee Cooperatives	***6.07***	***7.34***	***5.02***	***5.83***
All Tennessee	***5.94***	***6.80***	***4.85***	***5.48***

Source: Tennessee Valley Authority, *Summary of Financial Statements, Sales Statistics, and Rates*, 1997.

Appendix E: Residential Natural Gas Consumption, 1997 (million cubic feet per year)

USA States	Popluation	Residential Gas Consumption	Per Capita Residential Consumption	Rank (per capita) out of 51
Alabama	4,322,113	48,496	11,220	39
Alaska	609,655	15,148	24,847	13
Arizona	4,553,249	31,057	6,821	45
Arkansas	2,523,186	42,058	16,669	29
California	32,182,118	478,904	14,881	33
Colorado	3,892,029	115,583	29,697	5
Connecticut	3,267,240	40,562	12,415	35
Delaware	735,143	15,807	21,502	19
District Of Columbia	529,895	8,972	16,932	27
Florida	14,677,181	13,117	894	49
Georgia	7,489,982	114,383	15,271	30
Hawaii	1,192,057	517	434	51
Idaho	1,208,865	15,239	12,606	34
Illinois	11,989,352	497,290	41,478	1
Indiana	5,864,847	169,140	28,840	6
Iowa	2,854,330	89,696	31,425	4
Kansas	2,601,437	61,415	23,608	15
Kentucky	3,910,366	66,033	16,887	28
Louisiana	4,353,646	52,709	12,107	37
Maine	1,241,895	1,009	812	50
Maryland	5,094,924	77,500	15,211	31
Massachusetts	6,114,440	112,308	18,368	24
Michigan	9,779,984	379,838	38,838	2
Minnesota	4,687,408	128,873	27,493	9
Mississippi	2,731,644	27,626	10,113	42
Missouri	5,408,455	127,625	23,597	16
Montana	878,730	21,002	23,900	14
Nebraska	1,657,009	47,105	28,428	7
Nevada	1,678,691	25,243	15,037	32
New Hampshire	1,172,140	6,939	5,920	47
New Jersey	8,058,384	216,925	26,919	11
New Mexico	1,723,965	36,623	21,243	20
New York	18,146,200	375,641	20,701	21
North Carolina	7,430,675	52,894	7,118	44
North Dakota	640,965	11,370	17,739	26
Ohio	11,192,932	354,543	31,676	3
Oklahoma	3,321,611	71,762	21,605	18
Oregon	3,243,272	31,522	9,719	43
Pennsylvania	12,011,278	262,494	21,854	17
Rhode Island	987,263	18,162	18,396	23
South Carolina	3,788,119	25,741	6,795	46
South Dakota	737,755	13,203	17,896	25
Tennessee	*5,371,693*	*64,130*	*11,939*	*38*
Texas	19,385,699	234,988	12,122	36
Utah	2,065,001	58,108	28,139	8
Vermont	588,632	2,631	4,470	48
Virginia	6,737,489	73,905	10,969	41
Washington	5,614,151	61,813	11,010	40
West Virginia	1,815,231	35,996	19,830	22
Wisconsin	5,201,226	135,819	26,113	12
Wyoming	480,043	12,999	27,079	10
U.S. Total	**267,743,595**	**4,983,772**	**18,614**	

Source: Energy Information Administration, *Natural Gas Annual, 1997*.

Appendix F: Implications of Restructuring for Taxes Affecting Tennessee's Electric Utility Industry

Tax or Tax-Equivalent	Amount Paid, 1998	Potential Impacts of Restructuring
State		
Franchise and excise taxes	$617,959	a. Competition would likely bring more investor-owned utilities, marketing firms, and other private services into Tennessee, thus increasing the business tax base. b. If part or all of TVA is privatized, that would increase the business tax base.
Gross receipts tax	$2,217,657	a. Restructuring might include applying gross receipts tax to out-of-state sellers. b. Consumption tax would likely include removing gross receipts tax from generation. c. Tax revenue from transmission and distribution depends on future of TVA and whether this tax would be applied to all utilities, public and private.
Sales tax	$55,085,458	A consumption tax would raise this considerably; it would likely tax residential and industrial use at higher rates.
TVA tax-equivalent payment	$112,928,289	a. Depends partly on Congressional actions. b. These are based on gross receipts, and would change to the extent that competition changes TVA's total revenues. c. A consumption tax would likely replace tax-equivalent payments, at least those based on generation revenues and property.
Local		
Property tax from IOUs	$1,781,182	a. There may be more investment by non-TVA generators in Tennessee, bringing more property tax revenues. b. One option for TVA's future is partial or total privatization, which would allow previously untaxed TVA property to be taxed as part of an investor-owned utility. c. A consumption tax would likely replace property taxes on generation. Currently, the only non-TVA generator in Tennessee is exempt from local property taxes.
Property tax from Coops	$1,084,580	No expected effect.
TVA tax-equivalent payment	$18,672,621	a. Depends partly on Congressional actions. b. These are based on gross receipts, and would change to the extent that competition changes TVA's total revenues. c. A consumption tax would likely replace at tax-equivalent payments, at least those based on generation revenues and property.
Municipal tax-equivalent payment	$76,500,000	a. These are based on a combination of gross receipts and property, and they would change to the extent that restructuring changes municipal utilities' revenues. b. A consumption tax would likely replace tax-equivalent payments, at least those based on generation revenues and property.

Note 1: Sales tax amounts are estimated by the Tennessee Department of
Note 2: Some figures for F&E and Gross Receips taxes were from 1997.
Note 3: No tax data were available for Entergy Arkansas.
Note 4: Gross receipts taxes were assumed to be the $100 minimum for those not reporting or not

Appendix G: TVA's Fossil Air Emissions Compared to Top 10 U.S. Polluters

Top Ten Fossil NO_X Polluters (lbs/MWh)	
Tennessee Valley Authority	*1st*
Associated Electric Coop	2
TECO Energy	3
NIPSCO Industries	4
Illinova Corporation	5
Carolina Power and Light Company	6
American Electric Power	7
Buckeye Power	8
SCANA Corporation	9
Duke Power Company	10

Top Ten Fossil SO_2 Polluters (lbs/MWh)	
Illinova Corporation	1
Niagara Mohawk Power Corporation	2
PP&L Resources	3
Buckeye Power	4
Centerior Energy	5
GPU	6
Cinergy Corporation	7
CIPSCO	8
City of Seattle	9
Tennessee Valley Authority	*10th*

Top Ten Fossil CO_2 Polluters (lbs/MWh)	
Northern States Power	1
Cajun Electric Power Coop	2
Omaha Public Power District	3
Idaho Power Company	4
Basin Electric Power Coop	5
Wisconsin Energy Corporation	6
NIPSCO Industries	7
Pacificorp	8
Cinergy Corporation	9
City of Seattle	10
Tennessee Valley Authority	*36th*

Source: National Resource Defense Council and Public Service Electric and Gas Company, *Benchmarking Air Emissions of Electric Utility Generators in the U.S.*, 1996.