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Tennessee Valley Authority's Payments in Lieu of Taxes

The Tennessee Advisory Commission on Intergovernmental Relations was directed by the Electric Generation and Transmission Cooperative Act of 2009 (Section 4 of Public Chapter 475, Acts of 2009) to monitor changes in the wholesale distribution of electric power by the Tennessee Valley Authority (TVA) and its distributors for possible effects on the Authority's payments in lieu of taxes (PILOTs) to the states in the Valley region. The Commission's report was to "include recommendations, if any, on adjustments to the state tax system that would keep the state and local governments whole from such future changes." The Act authorized the creation of nonprofit membership cooperatives to generate and transmit electricity in Tennessee. At the time, one such co-op already owned a power-generating facility in Mississippi, and the legislature was concerned that, having authorized them, they had opened the door to a potential decline in TVA's payments to the states if the co-ops began selling electricity directly to distributors.

After considering a number of options, including those developed by the Commission,¹ the Tennessee General Assembly passed Public Chapter 1035, Acts of 2010, requiring payments equivalent to TVA's Tennessee PILOT from any other entity providing wholesale electric current for resale within the state, such as the electric generation and transmission cooperatives authorized in 2009. Public Chapter 1035 was designed to ensure that revenue from power sales in the TVA region would not depend on who produced that power or who sold it. The act also renewed the requirement that the Commission monitor the effects of the 2009 act and report to the General Assembly annually. This is the Commission's report for the 2018 legislative session.

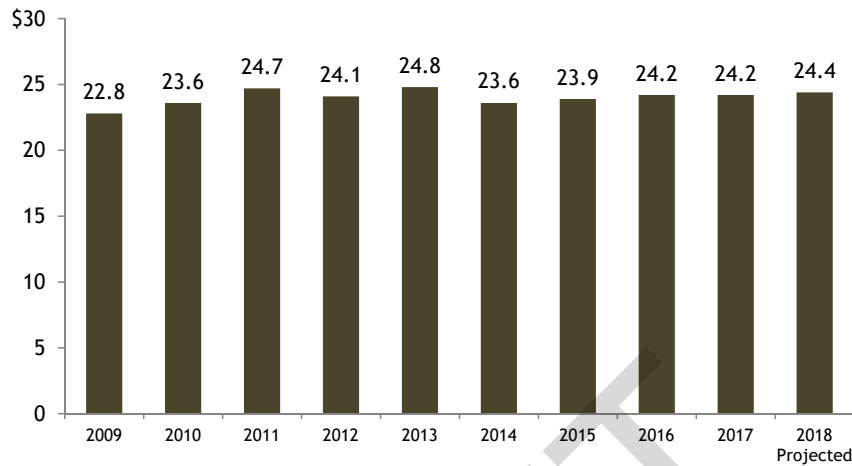
Although the 2010 law put to rest immediate concerns about the potential loss of TVA revenue created by the 2009 law, concerns about the problems created by TVA's debt ceiling, which has not been raised since 1979,² and the threat of privatization continue to reappear from time to time. Both were among the reasons given by power distributors in the region for seeking authorization to form the generation and transmission co-operatives authorized by the 2009 Act. TVA's debt ceiling remains \$30 billion, which because of inflation now has the buying power that \$10 billion would have had in 1979, but the threat of privatization has diminished at least for the time being.³ Figure 1 shows the level of TVA's debt since 2009.

¹ Tennessee Advisory Commission on Intergovernmental Relations 2010.

² 16 United States Code 831 n-4(a).

³ Tennessee Valley Authority 2015g.

**Figure 1. Tennessee Valley Authority Statutory Debt
at Federal Fiscal Year End
(in billions)**



Source: Tennessee Valley Authority 2014a; Tennessee Valley Authority 2017a; and email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, January 11, 2018.

To manage within its \$30 billion debt limit, TVA has adopted a number of innovative but by its own account costly financing techniques, some of which can alter the amount of PILOT revenue paid directly to states. The lease-and-lease-back technique used so far to finance the expansion of power production in Tennessee does not affect the amount of the PILOT paid directly to Tennessee, but the sale-and-lease-back technique used at one of its plants in Mississippi reduced the amount paid directly to that state, and the potential for the same exists throughout the region. The difference is in who owns the property and whether it is subject to state and local taxes.

Recent changes in TVA's supply system continue to affect the balance of PILOTs across the region. TVA has shifted power production away from coal in response to economic factors and environmental mandates, retiring numerous coal-fired units at its power plants since 2012, while completing a second nuclear reactor at its Watts Bar facility in Rhea County and building or acquiring several new natural gas-fired facilities. In the states where these new or retired facilities are located, the changes have affected the value of TVA power property, one of two factors determining each state's share of the PILOT. TVA's investments in nuclear and natural gas in Tennessee combined with retirements of coal-fired units in Alabama and Kentucky have more than offset coal-fired retirements in Tennessee in past years. But this year, the Authority's investments in natural gas-fired units in Kentucky, which increased the value of TVA power property in that state, caused a slight shift in the balance of the PILOT away from Tennessee. Moreover, the December 2017 retirement of the last four coal-fired units at TVA's Johnsonville plant in Humphreys County will reduce that plant's value and could reduce Tennessee's share of the PILOT going

forward, unless it too is offset by increases in the value of TVA power property elsewhere in the state or by net reductions in other states.

TVA's decision to make these changes predates but is consistent with the management strategy laid out in its 2015 Integrated Resource Plan (IRP).⁴ The IRP calls for closing a number of old coal-fired generating plants, building or acquiring plants powered by natural gas, expanding nuclear-powered facilities, and relying more on renewable energy and energy efficiency. The plan's strategies for increasing energy efficiency, if successful, could reduce TVA revenues and ultimately the PILOT for all recipients, as could other factors, such as the economy and the weather. None of these changes appear to warrant legislative action at this time but should continue to be monitored.

TVA's Payments in Lieu of Taxes Continue to Fluctuate

According to a press release issued in November 2017, TVA's actual payments in lieu of taxes for federal fiscal year 2016-17 amounted to \$517 million, of which \$344 million was paid to Tennessee governments, including \$3.4 million in direct payments to counties. Payments to all states decreased \$18 million from the previous fiscal year. TVA attributes this decrease to mild winter weather, which resulted in less electricity being used for heating, and consumers' energy efficiency efforts.⁵ Following decreases in each of the last two fiscal years, payments to all states for the current fiscal year, federal fiscal year 2017-18, are estimated to increase \$7 million to a total of \$524 million.

Payments to Tennessee are estimated to increase \$3 million to a total of \$347 million, of which \$3.4 million will again be paid directly to counties, in federal fiscal year 2017-18. But Tennessee's percentage of the Authority's overall payments decreased for the first time since federal fiscal year 2008-09, though only slightly. This decrease is likely attributable to the construction of new natural gas-fired units at TVA's Paradise steam plant in Kentucky, which increased the value of TVA power property in that state relative to other states in the region, including Tennessee.⁶

Total payments are based on five percent of prior-year gross proceeds⁷ from power sales, and funds are divided among the eight states in which

⁴ Tennessee Valley Authority 2015d.

⁵ Tennessee Valley Authority 2017e; see link for information on TVA's 2017 tax equivalent payments.

⁶ Email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, January 11, 2018.

⁷ TVA interprets "gross proceeds" as the proceeds from the sale of power to municipalities, cooperatives, and industries. The TVA Act specifically excludes TVA's sales to federal agencies from the PILOT calculation.

TVA owns power property⁸ based both on revenues from power sold by TVA and on the value of TVA power property located in each state. Although TVA buys power from other sources, those purchases have no effect on the amount each state receives from its PILOTs. See appendix A for an explanation of TVA's allocation formula.

Tennessee still receives more than 66% of the total distributed through TVA's formula. Past increases in this percentage helped offset what would have otherwise been larger decreases in TVA's payments to Tennessee in three of the last five federal fiscal years. See table 1.

Table 1. Tennessee Valley Authority Revenue Sharing
Distribution to Tennessee by Federal Fiscal Year (in millions)

	2017-18*	2016-17	2015-16	2014-15	2013-14	2012-13
TVA's Overall PILOT	\$ 523.7	\$ 517.1	\$ 534.8	\$ 542.0	\$ 533.1	\$ 547.4
Tennessee's Percent	x 66.33%	66.54%	65.78%	65.31%	62.83%	61.69%
Tennessee's Amount	\$ 347.3	\$ 344.1	\$ 351.8	\$ 354.0	\$ 335.0	\$ 337.7
Direct Payment to Counties	- 3.4	3.4	3.4	3.4	3.4	3.4
Tennessee's Share	\$ 344.0	\$ 340.7	\$ 348.5	\$ 350.6	\$ 331.6	\$ 334.3

* Estimate based on unaudited gross receipts. TVA distributes payments monthly from October through August based on this estimate then makes a final payment for the fiscal year in September based on audited revenue figures. It is not unusual for the final payment to be adjusted upward from the original estimated amount.

Note: Share distributed to Tennessee may not equal amount allocated to state minus direct payments to counties because of rounding.

Source: Tennessee Valley Authority

Tennessee's local governments continue to receive around 45% of the amount TVA allocates to Tennessee for distribution through the state's own formula. Under Tennessee Code Annotated, Section 67-9-101 et seq., this formula distributes a portion of Tennessee's share to cities and counties with additional payments set aside for local governments in counties with TVA construction. The rest is reserved for the state. Distributions through the formula, which are calculated on a state fiscal year basis, are directly affected by the increasing total payments to Tennessee in federal fiscal year 2017-18 and by TVA construction projects. See appendix B for an explanation of Tennessee's allocation formula.

On a state fiscal year basis, the 2017-18 allocations excluding payments set aside for local governments in counties with TVA construction will increase by \$741 thousand for counties, by \$315 thousand for cities, and by \$115 thousand for the state's own agencies. Payments related to TVA construction, however, will decrease by \$610 thousand for counties and by \$322 thousand for cities because of recent project completions. While combined these amounts result in a small overall increase, they total less than the estimated increase in payments to Tennessee for federal fiscal

⁸ TVA interprets "power property" to include facilities that generate electricity, property used to transmit electricity, coal assets, and a portion of the overall value of TVA's reservoir properties.

year 2017-18 because the state's fiscal year begins on July 1, three months earlier than the federal fiscal year. As a result, Tennessee's distribution to local governments and the state for state fiscal year 2017-18 includes TVA's payments for the last three months of federal fiscal year 2016-17, when the PILOT decreased. See appendixes C and D for the distribution to local governments within the state by county and city since state fiscal year 2010-11, excluding payments set aside for local governments in counties with TVA construction, which can be found in appendixes E and F.

TVA's Efforts to Meet Power Needs and Remain Within Its Debt Limit

To meet the region's power demand, TVA must plan for both short-term and long-term fluctuations in the use of electricity while staying within its statutory debt limit of \$30 billion. The Authority has developed a number of strategies for managing its system to meet demand within these constraints. These strategies have and will continue to affect TVA's payments to Tennessee.

Short-Term System-Management Strategies

TVA meets short-term-demand increases that result from extreme weather by operating additional facilities that are used only in times of high demand, purchasing power from other utilities, and cutting off power to customers with interruptible contracts. These strategies enabled TVA to meet record power demands on January 8, 2015, when demand hit the third highest winter peak in TVA's history at 32,723 megawatts⁹ and again on February 19, 2015, when demand set a record for that month at 32,109 megawatts.¹⁰ According to the Authority, "meeting the demand required the combined effort of TVA's employees and generating facilities, coordination with the Valley's 155 local power companies and large industrial customers, and the cooperation of businesses and households to conserve."¹¹ TVA used natural gas plants to supplement the power provided by its coal-fired, nuclear, and hydroelectric facilities and purchased additional power from the open market to manage a similar period of peak demand in 2014.¹² But managing peak demand can require temporarily cutting off power to customers that have agreed to allow TVA and its distributors to interrupt service to them during emergencies¹³ in exchange for credits on their power bills¹⁴ as happened at Murray State University in 2014.¹⁵ Although extreme

⁹ Tennessee Valley Authority 2015a.

¹⁰ Tennessee Valley Authority 2015f.

¹¹ Ibid.

¹² Tennessee Valley Authority 2014c.

¹³ Flessner 2014.

¹⁴ Tennessee Valley Authority 2011.

¹⁵ Canning, Lampe, and Null 2014.

weather could affect the amount and distribution of TVA's payments to the states, these events were too short-lived to have a noticeable effect.

Long-Term System-Management Strategies

TVA's long-term management strategies are laid out in its updated Integrated Resource Plan, which was approved by the TVA Board in August 2015. The update, a response to changes in the utility industry including lower-cost natural gas and renewables as well as decreased demand caused by economic changes and energy efficiency efforts,¹⁶ analyzed five strategies for meeting demand.

- Traditional utility approaches for optimizing cost
- Planning to meet demand while also meeting an emissions target
- Purchasing additional power from other utilities to meet most demand increases
- Maximizing energy efficiency
- Maximizing renewables¹⁷

These strategies could affect the amount and distribution of the Authority's payments to the states in the future. TVA has been continually updating its generating system to meet the needs of the region's growing economy and tighter air-quality standards. As early as the 1960s and 1970s, TVA was investing heavily in nuclear power for both of these reasons. More recently, the Authority has invested in natural gas-powered facilities to meet periodic surges in demand caused by the weather. TVA's implementation of its long-term management strategies, which will affect the distribution of its PILOTs, will be affected by the economics of power production and the requirements of the Clean Air Act (CAA) and other environmental regulations as well as TVA's debt limit.

TVA's Debt Limit and Financing Arrangements

Earlier concerns about TVA's financing arrangements for new generating capacity in the region and their potential effects on PILOTs in the region and across the state have diminished as the Authority has modified its strategies. In order to stay within the \$30 billion debt ceiling imposed on it by the Congress in 1979,¹⁸ TVA began using new financing methods,¹⁹ some of which affected the distribution of PILOT funds for some states, including the amount those states had available to allocate to their counties and cities. One technique is the leasing of generating facilities, an approach TVA has no current plans to expand.²⁰

¹⁶ Tennessee Valley Authority 2015h.

¹⁷ Tennessee Valley Authority 2015d.

¹⁸ 16 United States Code 831 n-4(a).

¹⁹ US General Accounting Office 2003.

²⁰ For details on existing lease arrangements, see Tennessee Valley Authority 2017b.

Shortly before the Electric Generation and Transmission Cooperative Act was passed in 2009, TVA entered into an agreement with a group of its distributors organized as the Seven States Power Corporation, a nonprofit company.²¹ Seven States purchased an interest in TVA's Southaven, Mississippi, power plant with the agreement that TVA would continue to operate it. TVA later bought back all of Seven States' interest in the plant.²² Under the sale-and-lease-back arrangement, while it was active, all sales of electricity produced at Southaven were through TVA and, therefore, were accounted for as TVA revenues and subject to the PILOT allocation to states.

Leasing arrangements such as the one used in Southaven during this agreement do not change the total amount of the PILOT under the TVA formula, nor do they change the allocation across states. Section 15d(g) of the Tennessee Valley Authority Act of 1933 says that

. . . power generating and related facilities operated by the Corporation under lease and lease-purchase agreements shall constitute power property held by the Corporation within the meaning of section 13 of this Act . . .

This provision causes facilities operated by TVA under leases to be included in the calculation of the value of power property under Section 13, which means that the value of TVA property in a state does not change when TVA sells a facility and then leases it back as the Authority did with Southaven.²³

Although the change in ownership of the Southaven plant did not affect the amount of TVA's PILOT allocated to each state, it did affect the PILOT distribution to the state of Mississippi. When TVA leases power property owned by other entities, it reduces the PILOT distributed to the state in which the property is located to the extent that it reimburses the plant owners for taxes they must pay to the state or local governments. This reduces the amount of TVA PILOT that goes through the state's own allocation formula. Section 15d(g) of the 1933 act goes on to say

. . . that portion of the payment due for any fiscal year under said section 13 to a state where such facilities are located which is determined or estimated by the Board to result from holding such facilities or selling electric energy generated thereby shall be reduced by the amount of any taxes or tax equivalents applicable

²¹ Tennessee Valley Authority 2009.

²² Tennessee Valley Authority 2013a.

²³ Moreover, this means that when TVA leases a facility that it did not previously own, such as the Caledonia plant in Mississippi, the value of TVA power property in the state where the facility is located actually increases.

to such fiscal year paid by the owners or others on account of said facilities to said state and to local taxing jurisdictions therein.

The initial sale-and-lease-back arrangement at the Southaven plant and the Authority's current lease arrangement at the privately owned Caledonia plant, also in Mississippi, illustrate the effect of this second provision. Privately owned plants are, of course, subject to state and local taxes. Consequently, the portion of the TVA PILOT paid directly to Mississippi, related to Caledonia, was reduced by approximately \$1 million in 2016-17 and will again be reduced by an estimated \$1 million in 2017-18.²⁴ This works much like the \$3+ million in direct payments TVA makes to counties in Tennessee. Direct payments are taken off the top of TVA's PILOT to each state, reducing the amount allocated through the state's statutory formula.

The amount allocated through Tennessee's formula, including the amount retained by the state in its general fund, would be reduced by any taxes paid on account of any plant operated through a sale-and-lease-back arrangement if that were to occur. Tennessee might want to mitigate that reduction by modifying its allocation formula to offset the direct payments of taxes by, for example, reducing the allocation to any particular jurisdiction by the amount of the reimbursement TVA made to the plant owners. It is possible, of course, that the reimbursement amount to those jurisdictions could be greater than the allocation through the state formula, so considerable thought would need to go into making such a change.

TVA chose a somewhat different leasing strategy to raise funds for generating expansions in Tennessee without approaching its debt ceiling. Thus far, arrangements in Tennessee have been lease-and-lease-back agreements, which do not jeopardize the amount of the PILOT controlled by Tennessee's allocation formula. An example is the natural gas combined-cycle plant built between 2010 and 2012 in Hawkins County next to the John Sevier fossil plant and leased to a private company in January 2012. The company paid TVA \$1 billion for the lease and then leased the plant back to TVA for 30 years.²⁵ This lease arrangement changes neither the ownership of the property nor TVA revenues and thus has no effect on the PILOT allocation across states or the amount distributed to Tennessee. Similarly, after repurchasing Seven States' 90% share of the Southaven plant, TVA then entered into a leasing arrangement with Southaven Combined Cycle Generation LLC in which the facility is leased to the company and, in turn, the facility is leased back to TVA.²⁶

²⁴ Email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, September 28, 2017; and Schoolfield 2017.

²⁵ Tennessee Valley Authority 2013a.

²⁶ Tennessee Valley Authority 2013c.

Currently, TVA has no reported plans for any new lease arrangements in Tennessee, including sale-lease-back arrangements that would affect the state's share of the Authority's PILOT, in the short-term.²⁷ However, the possibility exists that TVA could use leasing strategies in the future to finance new construction if its debt limit remains capped at \$30 billion. In its most recent *Form 10-K* filed with the US Securities and Exchange Commission, TVA acknowledges its use of these innovative financing techniques and says that it may eventually seek similar arrangements. But it mentions no immediate plans to do so.²⁸

In the past, TVA has said that

while such leasing transactions allow TVA to diversify its asset financing program, financing an asset by using the proceeds of leasing transactions is typically more costly to TVA than financing an asset with the proceeds of Bonds.²⁹

In April 2015, TVA purchased Quantum Utility Generation's Choctaw combined-cycle natural gas plant near Ackerman, Mississippi. Although the purchase used traditional forms of financing, the acquisition allows for future ownership by Seven States Power Corporation, which could affect the PILOT depending on the type of sale or lease arrangement adopted.³⁰

Rebalancing Power Sources and Increasing Efficiency Could Affect PILOTs

As TVA continues to rebalance its generating fleet, the resulting changes could cause shifts in the value of power property from state to state and from county to county, which could affect each state's and county's share of TVA's PILOT. Many of these changes—consistent with environmental mandates, the economics of power production, and the recommendations in TVA's 2015 IRP—involve the retirement of existing coal-fired units at TVA power plants. Because retired units are no longer used to produce power, TVA accelerates their depreciation so that only their residual value is included in the PILOT distribution formula.³¹

Changes in TVA's generating fleet in recent years have generally increased the value of TVA power property in Tennessee relative to other states in the region.³² Although TVA retired coal-fired units at its John Sevier

²⁷ Email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, January 11, 2018.

²⁸ Tennessee Valley Authority 2017b.

²⁹ Tennessee Valley Authority 2013a.

³⁰ Tennessee Valley Authority 2015e.

³¹ Email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, January 6, 2016.

³² Email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, September 28, 2017.

plant in Hawkins County between 2012 and 2014 and at its Johnsonville plant in Humphreys County in 2015, the resulting reductions in these plants' values have been more than offset both by TVA's investments in its Tennessee facilities and by its retirement of additional coal-fired units in other states. Recent investments in TVA's Tennessee facilities include natural gas-fired units completed in 2012 at its John Sevier plant, a second nuclear unit completed in 2016 at its Watts Bar plant in Rhea County, and ongoing construction begun in 2015 at Boone Dam on the border of Sullivan and Washington counties. TVA also retired coal-fired units at its Colbert and Widows Creek plants in Alabama between 2013 and 2016 and at its Shawnee plant in Kentucky in 2014.³³

But as discussed above, Tennessee's share of TVA power property decreased in federal fiscal year 2016-17 for the first time since federal fiscal year 2008-09. The decrease this year is likely attributable to investments in natural gas-fired units completed in 2017 at TVA's Paradise plant in Kentucky, which increased the value of TVA power property in that state despite the subsequent retirement of two of the plant's three coal-fired units.³⁴ Moreover, TVA's retirement of the last four coal-fired units at its Johnsonville plant in December 2017 could reduce Tennessee's share of TVA power property and the PILOT in future years unless it too is offset by increases in the value of TVA power property elsewhere in the state or by net reductions in other states.³⁵ TVA is currently building natural gas-fired units and a solar power facility at its Allen plant in Memphis, but it plans to retire all three coal-fired units at the plant once the new gas-fired units become commercially operational. The 2016 sale of TVA's partially finished Bellefonte nuclear plant in Alabama will reduce the value of TVA power property in that state, though only slightly.³⁶

TVA's 2015 IRP also calls for energy efficiency savings of between 900 and 1,300 megawatts by 2023 and between 2,000 and 2,800 megawatts by 2033.³⁷ Some of that improved efficiency will occur through upgrading power transmission and distribution systems; some will occur in private homes and businesses. As customers update their homes, commercial and industrial facilities, and electrical appliances and equipment, those changes reduce existing power demand, which could reduce TVA revenues and

³³ Tennessee Valley Authority 2017b; and Flessner 2017.

³⁴ Email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, January 11, 2018.

³⁵ Tennessee Valley Authority 2018.

³⁶ Tennessee Valley Authority 2017b; and email from Stephen Schoolfield, senior program manager-taxes, Tennessee Valley Authority, January 17, 2018.

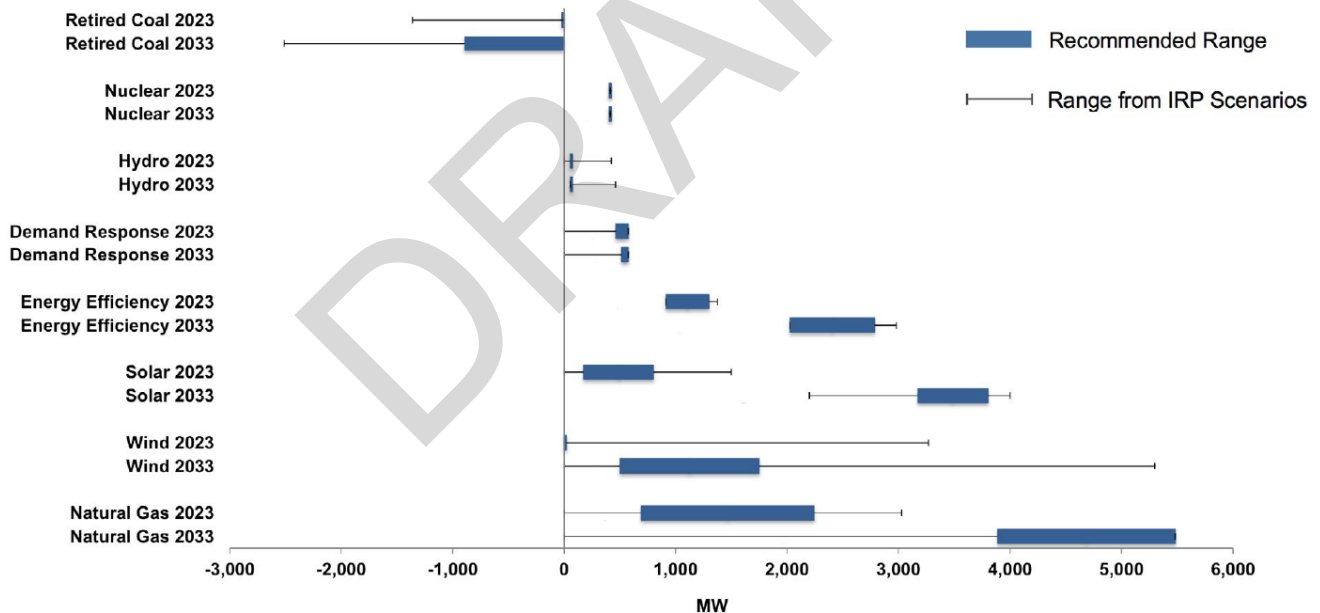
³⁷ Tennessee Valley Authority 2015d. By way of comparison, TVA's combined-cycle natural gas plant in Ackerman, Mississippi is capable of producing 705 megawatts of electricity, enough to power more than 400,000 homes; see, <https://www.tva.gov/Energy/Our-Power-System/Natural-Gas/Ackerman-Combined-Cycle-Plant>.

ultimately the PILOT for all recipients if the amount of electricity consumed does not continue to grow with the population and the economy.

The Shift Away from Coal: Environmental and Business Reasons

Since the 1950s, coal-fired plants have been TVA's largest single source of power, but because of their age and changing air-quality requirements, the Authority is shifting emphasis from coal to other power sources (see figure 2 from the 2015 IRP and appendix G). As its coal-fired power plants age, TVA must either retire them or install costly upgrades to meet new air-quality standards that tighten restrictions on the emission of particulates, sulfur dioxide, nitrogen oxides, mercury, lead, and carbon—the major byproducts of burning coal. The cost of upgrading existing coal-fired facilities, the relative cleanliness of other fuels, and the decreasing cost of natural gas have also resulted in a competitive advantage for other methods of generating electricity.

Figure 2. TVA Capacity Changes in Megawatts by 2023 and 2033



Source: Tennessee Valley Authority 2015d.

Fossil Plant Retirements Required by Environmental Agreements

To resolve a series of legal challenges brought under the Clean Air Act by several states, including Tennessee, and environmental groups, TVA entered into two settlements in April 2011 in which it agreed to retire 18 of its 59 coal-fired units before 2018. Those retired prior to last year's report

include two of four coal-fired units at TVA's John Sevier plant in Hawkins County, which as noted above were replaced by a combined-cycle gas plant on an adjacent site, six of the ten coal-fired units at its Johnsonville plant in Humphreys County, and six of eight coal-fired units at its Widows Creek plant in Alabama.³⁸ With the retirement of the last four units at the Johnsonville plant in December 2017, all 18 affected units have now been retired.³⁹ See table 2.

Table 2. Tennessee Valley Authority Coal-Fired Units to be Retired Under Environmental Agreements

Fossil Plant	Units Affected	Existing Scrubbers and SCRs*	Requirements Under Environmental Agreements	Retirements Implemented or Planned to be Implemented by TVA as a Result of Environmental Agreements
John Sevier	2 of 4	None	<ul style="list-style-type: none"> Retire two units no later than December 31, 2012 	<ul style="list-style-type: none"> Retired Units 1 and 2 on December 31, 2012
Johnsonville	10 of 10	None	<ul style="list-style-type: none"> Retire six units no later than December 31, 2015 Retire four units no later than December 31, 2017 	<ul style="list-style-type: none"> Retired Units 5-10 on December 31, 2015 Retired Units 1-4 on December 31, 2017
Widows Creek	6 of 8	None	<ul style="list-style-type: none"> Retire two of Units 1-6 no later than July 31, 2013 Retire two of Units 1-6 no later than July 31, 2014 Retire two of Units 1-6 no later than July 31, 2015 	<ul style="list-style-type: none"> Retired Units 3 and 5 on July 31, 2013 Retired Units 1, 2, 4, and 6 on July 31, 2014

* Selective catalytic reduction systems ("SCR")

Source: Tennessee Valley Authority 2014b; Tennessee Valley Authority 2017b; and Tennessee Valley Authority 2018.

Fossil Plant Retirements for Business Reasons

Because of the competitive advantage over coal of other methods of generating electricity, TVA has retired 12 additional coal-fired units since 2013 and plans to retire three more by the end of 2018. The units retired for business reasons include the two remaining coal-fired units at TVA's John Sevier plant in Hawkins County and one of the ten units at its Shawnee plant in Kentucky in 2014, the last two units at its Widows Creek plant in Alabama in 2015, and all five coal-fired units at its Colbert plant in Alabama in 2016. Following the completion of new natural gas-fired units at its Paradise plant in Kentucky, TVA also retired two of the three coal-fired units at that facility in April 2017. Similarly, the Authority plans to retire all three coal-fired units at the Allen plant in Memphis and replace them with gas-fired units on an adjacent site before 2019.⁴⁰ See table 3.

³⁸ Tennessee Valley Authority 2014b; and Tennessee Valley Authority 2017b.

³⁹ Tennessee Valley Authority 2018.

⁴⁰ Tennessee Valley Authority 2014b; Tennessee Valley Authority 2017b; and Tennessee Valley Authority 2017c.

Table 3. Tennessee Valley Authority Coal-Fired Units to be Retired for Business Reasons

Fossil Plant	Units Affected	Existing Scrubbers and SCRs*	Requirements Under Environmental Agreements	Retirements Implemented or Planned to be Implemented by TVA for Business Reasons
Allen	3 of 3	SCRs on all three units	<ul style="list-style-type: none"> • Install scrubbers or retire no later than December 31, 2018 	<ul style="list-style-type: none"> • The Board approved the construction of a gas-fired plant at the current location of the Allen coal-fired site • Retire Units 1-3 after completion of the gas-fired plant before December 31, 2018
Colbert	5 of 5	SCR on Unit 5	<ul style="list-style-type: none"> • Remove from service, control, convert, or retire Units 1-4 no later than June 30, 2016 • Remove from service, control, or retire Unit 5 no later than December 31, 2015 • Control or retire removed from service units within three years 	<ul style="list-style-type: none"> • Retired Units 1-5 on April 16, 2016
John Sevier	2 of 4	None	<ul style="list-style-type: none"> • Remove from service two units no later than December 31, 2012 and control, convert, or retire those units no later than December 31, 2015 	<ul style="list-style-type: none"> • Retired Units 3 and 4 on June 25, 2014
Paradise	2 of 3	Scrubbers and SCRs on all three units	<ul style="list-style-type: none"> • Upgrade scrubbers on Units 1 and 2 no later than December 31, 2012 • Continuously operate emission control equipment on Units 1-3 	<ul style="list-style-type: none"> • New gas-fired plant built at the current location of the Paradise coal-fired plant began operation on April 7, 2017 • Retired Units 1 and 2 of coal-fired plant on April 15, 2017
Shawnee	1 of 10	None	<ul style="list-style-type: none"> • Control, convert, or retire Units 1 and 4 no later than December 31, 2017 	<ul style="list-style-type: none"> • Retired Unit 10 on June 30, 2014
Widows Creek	2 of 8	Scrubbers and SCRs on Units 7 and 8	<ul style="list-style-type: none"> • Continuously operate existing emissions control equipment on Units 7 and 8 	<ul style="list-style-type: none"> • Retired Units 7 and 8 on September 30, 2015

* Selective catalytic reduction systems ("SCR")

Source: Tennessee Valley Authority 2014b; Tennessee Valley Authority 2017b; and Tennessee Valley Authority 2017c.

TVA plans to continue operating 26 other coal-fired units. These include the lone unit at its Bull Run plant in Anderson County, both units at its Cumberland plant in Stewart County, all four units at its Gallatin plant in Sumner County, all nine units at its Kingston plant in Roane County, the nine remaining units at its Shawnee plant in Kentucky, and the lone remaining unit at its Paradise plant also in Kentucky. TVA decided to add pollution control devices to two of the units at Shawnee and all four units at Gallatin rather than retire them—TVA had the option to control or retire these units under the environmental settlements it agreed to in 2011.⁴¹ See table 4.

Table 4. Tennessee Valley Authority Coal-Fired Units That Will Continue to be Operated and Other Actions to be Taken

Fossil Plant	Units Affected	Existing Scrubbers and SCRs*	Requirements Under Environmental Agreements	Other Actions Taken or Planned
Bull Run	1 of 1	Scrubber and SCRs on unit	• Continuously operate existing emission control equipment	• Continuously operate existing emission control equipment
Cumberland	2 of 2	Scrubbers and SCRs on both units	• Continuously operate existing emission control equipment	• Continuously operate existing emission control equipment
Gallatin	4 of 4	None	• Control, convert, or retire all four units no later than December 31, 2017	• Added scrubbers and SCRs on all four units
Kingston	9 of 9	Scrubbers and SCRs on all nine units	• Continuously operate existing emission control equipment	• Continuously operate existing emission control equipment
Paradise	1 of 3	Scrubbers and SCRs on all three units	• Upgrade scrubbers on Units 1 and 2 no later than December 31, 2012 • Continuously operate emission control equipment on Units 1-3	• Continuously operate existing emission control equipment on Unit 3
Shawnee	9 of 10	None	• Control, convert, or retire Units 1 and 4 no later than December 31, 2017	• Added scrubbers and SCRs on Units 1 and 4

* Selective catalytic reduction systems ("SCR")

Source: Tennessee Valley Authority 2014b; Tennessee Valley Authority 2017b; and telephone interview with Don Houston, senior air program manager, Environmental and Energy Policy Department, Tennessee Valley Authority, January 11, 2018.

The EPA's Clean Power Plan: Current Status and Potential Effect on TVA

In its Clean Power Plan (CPP), the US Environmental Protection Agency (EPA) sets carbon-pollution reduction goals for each state. The CPP rule establishes interim and final carbon dioxide (CO₂) emission standards for

⁴¹ Tennessee Valley Authority 2017b.

fossil fuel-fired electric steam generating units (generally, coal- and oil-fired power plants) and natural gas-fired combined-cycle generating units. The rule requires each state to develop and implement plans that ensure the power plants in it—either individually, together, or in combination with other measures—achieve interim CO₂ emission standards between 2022 and 2029 and final CO₂ emission standards by 2030. Each state may select the measures it prefers “to shape [its] own emissions reduction pathways over the 2022-29 period.” The rule also allows states to work on “multi-state approaches, including emissions trading.”⁴²

Although finalized in August 2015, the CPP has not been implemented, and whether it will be implemented remains unclear. More than two dozen states—joined by industry and trade groups, utilities, and several policy organizations—sued to block the CPP, and the US Supreme Court granted a request to halt its implementation while the case is ongoing.⁴³ Further, in October 2017, the EPA issued a proposal to repeal the rule.⁴⁴ But the process for finalizing the repeal could take approximately a year, according to news reports. Several states and environmental groups have also indicated that they will challenge the repeal in court.⁴⁵

If the CPP were to become effective, then complying with it could result in further shifts away from coal-fired power in TVA's generating network. But it is too early to tell whether the Authority would have to retire coal-fired units in addition to those already scheduled to be retired for environmental or business reasons. According to TVA, “the impact of these rules on TVA and the states in TVA's service territory cannot be determined until the state plans are developed and approved by the EPA, but the impact on TVA could be significant.”⁴⁶

New Energy Sources to Meet the Region's Needs

As TVA retires existing coal-fired units, new energy sources—including natural gas, nuclear, wind, and solar—are being developed to meet the region's electricity needs. As noted above, new natural gas-fired units at TVA's Paradise plant in Kentucky became commercially operational in April 2017, and construction continues on natural gas-fired units at its Allen plant in Memphis—planned to be completed before 2019. A second nuclear reactor at TVA's Watts Bar plant in Rhea County also became commercially operational in October 2016.⁴⁷ While TVA sold its unfinished Bellefonte nuclear plant in Alabama in November 2016 citing

⁴² US Environmental Protection Agency 2017a.

⁴³ Tsang and Wyatt 2017.

⁴⁴ US Environmental Protection Agency 2017b.

⁴⁵ Volcovici 2017; The New York Times 2017; and Henry 2017.

⁴⁶ Tennessee Valley Authority 2015c.

⁴⁷ Tennessee Valley Authority 2016d.

no need for another large nuclear facility,⁴⁸ it submitted an application to the US Nuclear Regulatory Commission in May 2017 for the future placement of so-called “small modular reactor” units at a site near Oak Ridge, though TVA acknowledges it is “still several years away from any potential construction decision.”⁴⁹ TVA has contracts to purchase electricity from eight wind farms.⁵⁰ It recently entered contracts for solar power from projects being developed in Shelby County⁵¹ and Alabama,⁵² and in 2017, it announced the construction of a solar facility at its Allen plant in Memphis.⁵³

TVA continues to modify its renewable energy incentive programs both within the changing market for renewables, such as wind, solar, and hydroelectric, and as part of its ongoing effort to rebalance its generating system. These programs have no effect on TVA’s gross revenues, nor do they affect power sales in any state, and so have little to no effect on PILOTs to the several states. Participants continue to buy power from their local power companies and sell all of the power they generate through a system called dual metering to TVA. Their only potential effect would be the extent to which they reduce the Authority’s acquisition of new power property in any particular state.

TVA is making substantial changes in these incentive programs as it implements its 2015 IRP. The Authority has said in the past that

as renewable energy system costs continue to decrease and become more affordable, there is less need for subsidies for small-scale renewable generation. TVA wants to promote sustainable growth in small-scale renewable generation while continuing to support local industry and provide a smooth path to grid parity.⁵⁴

TVA has been encouraging the private sector to develop small and medium renewable energy projects by buying electricity from participants in several programs, two of which remain open to new applicants in 2018. The Green Power Providers program buys power from homeowners and businesses who install small renewable energy projects—including solar, wind, biomass, and hydro—with individual capacities of 50 kilowatts or less.⁵⁵ A 50-kilowatt solar installation can provide enough power for approximately

⁴⁸ Tennessee Valley Authority 2016a.

⁴⁹ Tennessee Valley Authority 2017f.

⁵⁰ Tennessee Valley Authority 2017b.

⁵¹ Tennessee Valley Authority 2016c.

⁵² Tennessee Valley Authority 2016b.

⁵³ Tennessee Valley Authority 2017d.

⁵⁴ Tennessee Valley Authority 2013b.

⁵⁵ Tennessee Valley Authority “Green Power Providers.”

five average-sized homes in Tennessee.⁵⁶ The Green Power Providers program will continue adding new projects in 2018.⁵⁷ Distributed Solar Solutions (DSS) is a pilot program that buys power from medium-sized solar projects directed by local power companies.⁵⁸ Eligible projects were initially required to have capacities greater than 50 kilowatts but no more than five megawatts;⁵⁹ the maximum individual capacity for new projects was reduced to two megawatts in 2017.⁶⁰ Currently, TVA plans to continue accepting new applicants for the DSS pilot but has not yet finalized program details for 2018.⁶¹ The Renewable Standard Offer (RSO) program, which stopped accepting new applicants after 2015,⁶² buys power from owners of medium-sized projects—including solar, wind, biomass, or methane—with individual capacities greater than 50 kilowatts but no more than 20 megawatts.⁶³ The RSO offering remains open to projects that have existing capacity allocations and are in the process of being completed.⁶⁴

TVA has controlled the cost of its renewable energy programs by limiting participation and capacity and by reducing subsidies over time. The Authority limited the RSO to 100 megawatts of new capacity per year from 2011 when the program began through 2015,⁶⁵ though it increased its annual limit on the RSO's Solar Solutions Initiative—and access to the initiative's premium rate—to 20 megawatts of new capacity in 2015⁶⁶ up from 10 megawatts when the initiative began in 2012.⁶⁷ TVA has limited Distributed Solar Solutions to a total of 10 megawatts of new capacity per year since introducing the pilot program in 2016.⁶⁸ TVA has also limited Green Power Providers to 10 megawatts of new capacity per year since it first placed a cap on the program in 2012.⁶⁹ Half of the Green Power Providers program's total allocation of 10 megawatts will be reserved for residential and smaller non-residential customers in 2018, while the other half will be reserved for larger non-residential customers.⁷⁰ This is

⁵⁶ Email from Grace Robertson, marketing manager, Lightwave Solar, February 23, 2015.

⁵⁷ Tennessee Valley Authority "Green Power Providers."

⁵⁸ Tennessee Valley Authority "Distributed Solar Solutions."

⁵⁹ Tennessee Valley Authority "Guidelines for Distributed Solar Solutions (2016)."

⁶⁰ Tennessee Valley Authority "Guidelines for Distributed Solar Solutions (2017)."

⁶¹ Telephone interview with Steve Noe, manager, midscale renewables, Business Development and Renewables Group, Tennessee Valley Authority, January 16, 2018.

⁶² Tennessee Valley Authority 2017b.

⁶³ Tennessee Valley Authority "Guidelines for Renewable Standard Offer."

⁶⁴ Tennessee Valley Authority 2017b.

⁶⁵ Tennessee Valley Authority "Guidelines for Renewable Standard Offer."

⁶⁶ Tennessee Valley Authority "Solar Solutions Initiative: Frequently Asked Questions."

⁶⁷ Telephone interview with Neil Placer, senior manager, Renewable Energy Solutions, Tennessee Valley Authority, February 20, 2015.

⁶⁸ Tennessee Valley Authority "Guidelines for Distributed Solar Solutions (2016)."

⁶⁹ Telephone interview with Neil Placer, senior manager, Renewable Energy Solutions, Tennessee Valley Authority, February 20, 2015.

⁷⁰ Tennessee Valley Authority "Green Power Providers." Under the program, smaller non-residential customers are those subject to the GSA-1 rate schedule. In general, the GSA-1 rate schedule is for businesses that not only have contracted or actual demand no greater than 50 kilowatts but also have used no more than 15,000 kilowatt-hours of electricity in any of the last 12 months.

a change from past years when the program's 10-megawatt allocation was split equally between residential and non-residential customers.⁷¹

TVA pays RSO participants a base rate that varies seasonally and with time of day and that increases each year a participant remains in the program. The base rate for new RSO participants in 2015 varied from less than three cents per kilowatt-hour to more than five cents per kilowatt-hour when it was introduced, with participants receiving a 5% increase each year.⁷² Within the RSO program, participants who generate no more than one megawatt of solar power may earn a premium of four cents per kilowatt-hour through the Solar Solutions Initiative for the first 10 years they participate in the RSO,⁷³ down from eight cents when the initiative began in 2012.⁷⁴ Similar to its RSO participants, TVA pays Distributed Solar Solutions participants a base rate that varies seasonally and with time of day and that increases each year a participant remains in the program. The base rate for new DSS participants in 2017 ranged from less than three cents per kilowatt-hour to almost five cents per kilowatt-hour, a decrease from 2016 when it ranged from less than four cents per kilowatt-hour to almost seven cents per kilowatt-hour. But the annual percentage increase doubled to 3% from 1.5%. Similar to RSO participants who qualify for the Solar Solutions Initiative, DSS participants also earn a premium of almost three cents per kilowatt-hour in addition to the escalated base rate.⁷⁵ TVA has not finalized a rate schedule for new participants in 2018.⁷⁶ TVA continues to alter the rates paid to new Green Power Providers participants. New residential and smaller non-residential participants in 2018 with systems greater than 500 watts but no greater than 10 kilowatts will receive nine cents per kilowatt-hour; all other new participants will receive 7.5 cents per kilowatt-hour.⁷⁷ New Green Power Providers participants had previously received at least the retail rate,⁷⁸ which on average in Tennessee is approximately 10.5 cents per kilowatt-hour for residential customers, 10.3 cents per kilowatt-hour for commercial customers, and 5.9 cents per kilowatt-hour for industrial customers, according to the US Energy Information Administration.⁷⁹ Prior to 2016, new participants also received an additional premium above the retail rate for the first 10 years they participated in the program, though

⁷¹ Tennessee Valley Authority "Green Power Providers Program Participation Guidelines (2017)."

⁷² Tennessee Valley Authority "Renewable Standard Offer Contract."

⁷³ Tennessee Valley Authority "Solar Solutions Initiative: Frequently Asked Questions."

⁷⁴ Roy 2013.

⁷⁵ Tennessee Valley Authority "Distributed Solar Solutions Contract (2016)"; Tennessee Valley Authority "Distributed Solar Solutions Contract (2017)"; and Tennessee Valley Authority "Guidelines for Distributed Solar Solutions (2017)."

⁷⁶ Telephone interview with Steve Noe, manager, midscale renewables, Business Development and Renewables Group, Tennessee Valley Authority, January 16, 2018.

⁷⁷ Tennessee Valley Authority "Green Power Providers."

⁷⁸ Tennessee Valley Authority "Green Power Providers Program Participation Guidelines (2017)."

⁷⁹ US Energy Information Administration 2017.

TVA had reduced this premium over the years to two cents per kilowatt-hour for new participants in 2015⁸⁰ from its original twelve cents in 2012.⁸¹

According to TVA's October 2015 report on efforts to develop a method for assessing the benefits and costs associated with various forms of distributed power-generation like the ones supported by these programs, the average value for solar generation for TVA was just over seven cents per kilowatt-hour, which was less than the average retail rate charged in 2015.⁸² In order to develop the method, TVA assembled a cross-section of participants from the Tennessee Valley region, including local power companies, the Tennessee Valley Public Power Association, various environmentally focused non-governmental entities, solar industry representatives, academia, state governments, and national research institutions. Response to the report has been mixed. Among participants who were critical of the report, while generally complimentary of the process and the effort, the Southern Environmental Law Center said the analysis did not properly consider solar power's environmental and health benefits,⁸³ and the Southern Alliance for Clean Energy, agreeing with that assessment, expressed concern that TVA already "lags behind neighboring states like Georgia and North Carolina in developing a strong solar market."⁸⁴ But others urged TVA to pursue the least cost source of power to keep its electric rates as low and competitive as possible.⁸⁵

⁸⁰ Tennessee Valley Authority "Green Power Providers Program Participation Guidelines (2015)."

⁸¹ Smith and Coggeshall 2013.

⁸² Flessner 2015; and Tennessee Valley Authority 2015b.

⁸³ Southern Environmental Law Center 2015.

⁸⁴ Nelson 2015.

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