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THE GAP-FILLING ROLE OF PRIVATE ENVIRONMENTAL GOVERNANCE

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Private environmental governance provides new tools that can fill gaps in government regulatory regimes. The Tennessee Valley Authority (TVA) is a valuable case study for testing the efficacy of private environmental governance because it is one of the largest utility carbon emitters and is largely insulated from near-term federal and state government pressure to reduce emissions. TVA is not on a trajectory to achieve the decarbonization targets necessary to meet the goals of the Paris Agreement, but private governance initiatives can motivate TVA to accelerate its decarbonization process. TVA's securities filings acknowledge that it faces material threats on the energy supply side from distributed generation and customer preferences for renewable energy, and on the energy demand side from efficiency and conservation. Private governance initiatives could address the supply side by inducing large corporate and institutional customers, bondholders, and households to press for decarbonization of TVA's generation assets. On the demand side, private initiatives could motivate action by offering TVA accelerated electrification of motor vehicle fleets and buildings in return for accelerated decarbonization of TVA's generation assets. The Article concludes that these private governance options are not a panacea, but they have the potential to fill an important gap in public climate governance and pose little risk of displacing more effective government action. The TVA example also demonstrates the wide range of private governance options that are available to motivate emissions reductions by other difficult-to-regulate emissions sources.

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INTRODUCTION

A central challenge for climate mitigation is the gap between the actions needed to reduce the risk of catastrophic climate change and the likelihood of an adequate government response. Prompt, major emissions reductions are necessary, yet federal legislation, whether in the form of a Green New Deal or a carbon tax, may require not only a change of control of the White House, but also sixty votes in the Senate.[1] National polls that signal majority support for climate-friendly politicians and policies can

[1] *See, e.g.*, Nives Dolsak, Aseem Prakash & Sarah Tucker, *Labor Unions and the Green New Deal: Love, Hate, or Indifference?*, FORBES (July 6, 2019), https://www.forbes.com/sites/prakashdolsak/2019/07/06/labor-unions-and-the-green-new-deal-love-hate-or-indifference/#1a736d5926b8 (discussing the challenges to adopting the Green New Deal from unions).

be misleading given the deep polarization of the United States ("U.S.") electorate, the effects of the Electoral College and *Citizens United* on presidential elections, and the fact that states with less than 20% of the U.S. population control a majority of votes in the Senate.[2]

Existing approaches to public governance of the energy sector exhibit substantial gaps, fragmented regulatory authority, unclear regulatory goals, and federal-state jurisdictional overlaps. For example, U.S. law articulates no clear national greenhouse gas ("GHG") emissions reduction target, and states—not the federal government—set their own targets for the electric power generation mix. Yet even when faced with a material risk and short time fuse, academic and policy debates proceed as if the feasibility of adopting government laws, policies and programs does not matter. [3]

Private environmental governance provides a valuable response by identifying viable new tools[4] that can fill gaps in federal and state regulatory regimes.[5] Private environmental governance occurs when private actors perform the traditionally governmental functions of reducing negative externalities, managing common pool resources, and distributing environmental amenities.[6] In the last decade, private environmental governance initiatives have focused on many of the same

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[2] *See* Eric W. Orts, *Senate Democracy: Resolving Our Lockean Paradox*, 68 AM. U.L. REV. 1981, 1985-86 (citing FRANCES E. LEE & BRUCE I. OPPENHEIMER, SIZING UP THE SENATE: THE UNEQUAL CONSEQUENCES OF EQUAL REPRESENTATION 10-11 (1999)).

[3] *See* Jonathan M. Gilligan & Michael P. Vandenbergh, *Accounting for Political Opportunity Costs in Climate Instrument Choice*, 32 VA. ENVTL. L.J. 1 (2014); Lawrence H. Goulder, *Timing Is Everything: How Economists Can Better Address the Urgency of Stronger Climate Policy*, 14 REV. OF ENVTL. ECON. & POL'Y 143 (2020).

[4] MICHAEL P. VANDENBERGH & JONATHAN M. GILLIGAN, BEYOND POLITICS: THE PRIVATE GOVERNANCE RESPONSE TO CLIMATE CHANGE (2017); Michael P. Vandenbergh & Jonathan M. Gilligan, *Beyond Gridlock*, 40 COLUM. J. ENVTL. L. 2, 217 (2015).

[5] These gaps arise because sectors that contribute major emissions have sufficient political lobbying power or public appeal to resist government regulation (e.g., the coal, petroleum, agriculture and household sectors) and because jurisdictions that oppose climate mitigation hinder cooperation across national and state boundaries. Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153 (2009); VANDENBERGH & GILLIGAN, BEYOND POLITICS, *supra* note 4, at ch. 3.

[6] Michael P. Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129 (2013); Sarah E. Light & Eric W. Orts, *Parallels in Public and Private Environmental Governance*, 5 MICH. J. ENVTL. & ADMIN. L. 1 (2015); Sarah E. Light, *The Law of the Corporation as Environmental Law*, 71 STAN. L. REV. 137 (2019).

subjects and used many of the same instruments as public governance,[7] and they are particularly important for addressing climate change.[8]

A common concern about private initiatives is that they could lead to negative policy spillovers.[9] For instance, they could reduce demand for government action if they induce the public to believe that private initiatives have solved the problem. Negative spillovers also could occur if directing resources toward promoting private initiatives reduces the resources available for promoting government initiatives.[10] Of course, private initiatives also could accelerate the adoption of government measures. They could build constituencies that support emissions reductions or circumvent worldview-based political gridlock by offering options that are more attractive to moderates and conservatives.[11] They also could serve a proof-of-concept function, reduce the cost of coordination among private actors, or reduce the cost of government measures after the measures are adopted.[12]

This Article uses the Tennessee Valley Authority ("TVA") as a case study to explore the role of private environmental governance when the risks of displacing public governance are low. TVA is a large source of GHG emissions, and it is unlikely to be subject to near-term federal or state GHG regulation. Congress created TVA in 1933 as a public corporation, gave it the exclusive right to sell electricity in a large service area that spans portions of seven states in the Southeast, and limited state regulatory oversight of its electricity operations. TVA accounts for approximately one percent of all U.S. GHG emissions, an amount roughly equal to all the emissions from the iron and steel sector or cement

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[7] *See* Light & Orts, *supra* note 6; Sarah E. Light & Michael P. Vandenbergh, *Private Environmental Governance*, *in* ENVIRONMENTAL DECISION MAKING, ENCYCLOPEDIA OF ENVIRONMENTAL LAW 253-67 (Robert Glicksman & LeRoy Paddock eds., 2016).

[8] David G. Victor, *Faced with Government Inaction, Private Firms Emerge as Major Players in Climate Change Mitigation*, SCIENCE, Dec. 18, 2017, https://blogs.sciencemag.org/books/2017/12/18/beyond-politics/ (book review).

[9] *See* Heather Barnes Truelove et al., *Positive and Negative Spillover of Pro-Environmental Behavior: An Integrative Review and Theoretical Framework*, 29 GLOBAL ENVTL. CHANGE 127 (2014) (distinguishing behavioral spillover effects from policy spillover effects); Thomas P. Lyon & John W. Maxwell, *Greenwash: Corporate Environmental Disclosure Under Threat of Audit*, 20 J. ECON. & MGMT. STRATEGY 3 (2006).

[10] *See* Josh Galperin, *Trust Me, I'm a Pragmatist: A Partially Pragmatic Critique of Pragmatic Activism*, 42 COLUM. J. ENVTL. L. 425, 494 (2017) (arguing that in some situations private governance initiatives "can weaken the entire endeavor"); Josh Galperin, *Board Rooms and Jail Cells: Assessing NGO Approaches to Private Environmental Governance*, 71 ARK. L. REV. 403 (2018) (discussing risks of private climate governance).

[11] VANDENBERGH & GILLIGAN, BEYOND POLITICS, *supra* note 4, at ch. 3.

[12] *See* Michael P. Vandenbergh, *Keynote: Motivating Private Climate Governance: The Role of the Efficiency Gap*, 71 ARK. L. REV. 349 (2018) (responding to Galperin).

sector in the U.S.[13] Lower natural gas prices, litigation, and other factors induced TVA to reduce its emissions by 51% between 2012 and 2018,[14] allowing TVA to produce electricity with a carbon intensity below the national average in 2018. New federal GHG regulations are unlikely to create pressure for additional near-term reductions, though, and most states in the TVA service area have resisted pressure to regulate GHG emissions.[15]

In addition, TVA's long-term emissions trajectory creates two problems. First, based on its most recent integrated resource planning ("IRP") document, TVA is not on a pathway to achieve widely-adopted decarbonization targets. Multiple studies suggest that deep decarbonization is necessary to achieve the 2°C goal adopted in the Paris Agreement, which for the U.S. electric utility sector means emissions reductions of roughly 80–100% by 2050.[16] Based on its most recent IRP base case, by 2030 TVA's emissions will be higher than this "80 by 50" pathway, and the gap will grow over time, exceeding the pathway by 75% by 2038.[17] Second, TVA faces an increasing mismatch between its renewable power generation and the renewables commitments of many of its customers. TVA's low-carbon electricity generation arises in large

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[13] *See* U.S. ENVIRONMENTAL PROTECTION AGENCY, *INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2017* ES-6 tbl.ES-2 (2019), https://www.epa.gov/sites/production/files/2019-04/documents/us-ghg-inventory-2019-main-text.pdf. **The Tennessee Valley Authority is one of many federal entities at the public-private boundary. For a review, see Anne Joseph O'Connell**, *Bureaucracy at the* ***Boundary***, 162 U. PA. L. REV. 841 (2014).

[14] For a non-profit group's discussion of TVA's emissions trajectory, *see* S. ALLIANCE FOR CLEAN ENERGY, TRACKING DECARBONIZATION IN THE SOUTHEAST 22 (2019), https://cleanenergy.org/wp-content/uploads/Tracking-Decarbonization-in-the-Southeast-2019.pdf.

[15] Several have actively sought to block federal or local government efforts to do so. *See* West Virginia v. EPA, *appeal docketed*, No. 15-1363 (D.C. Cir. Oct. 23, 2015). State petitioners included West Virginia, Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, and South Carolina.

[16] The lower end of this goal is often referred to as the "80 by 50" or "2°C" goal, and for simplicity in this Article we refer to the pathway necessary to achieve the goal as the "80 by 50" or "deep decarbonization" pathway. For a discussion of deep decarbonization, *see* discussion *infra* Part II; *see also* MICHAEL B. GERRARD & JOHN C. DERNBACH, LEGAL PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES (2019).

[17] *See infra* Part II. *See* TENN. VALLEY AUTH., 2019 INTEGRATED RESOURCE PLAN (2019), https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf [hereinafter TVA 2019 IRP]. TVA is the largest public power utility in the United States. Our analysis is roughly consistent with the conclusions of a recent report by the Southern Alliance for Clean Energy. *See* S. ALLIANCE FOR CLEAN ENERGY, *supra* note 15, at 22 ("[A]ccording to the final IRP, TVA's likely future resource mix would result in emissions that are only 57% below 2005 levels in 2038. That means TVA reduced emissions by 51% in 13 years but only plans to get another 6 percentage points of reductions in the next 20 years.").

part from nuclear facilities and a shift from coal to natural gas, but many investors and electric customers are beginning to demand renewable power, not just low-carbon power.[18]

Although TVA is unlikely to face government pressure, several private governance tools may motivate TVA to decarbonize more rapidly over the near-term and the long-term. Like many utilities, TVA's securities filings acknowledge that it faces material threats on the supply side from distributed generation and consumer preferences for renewable energy and on the demand side from efficiency and conservation.[19] Private governance initiatives could target the supply side by increasing pressure for low-carbon electricity from bondholders, large corporate customers, large institutional customers, and households.[20] For instance, a substantial number of TVA's large industrial, retail, and institutional electricity customers have made renewables or climate commitments that will be difficult to satisfy unless they induce TVA to decarbonize more rapidly or they defect from the TVA grid.[21] Cities in the region are also beginning to make decarbonization commitments.[22] A private governance initiative that mobilizes these private and public TVA customers and directs their attention to the mismatch between their commitments and TVA's emissions pathway could accelerate the decarbonization of the TVA grid.

On the demand side, private initiatives could motivate TVA to reduce GHG emissions by linking decarbonization to transportation and building electrification. In this Article, we focus primarily on motor vehicles, but electrification of buildings—including water heaters and other appliances, heating and cooling systems, and other aspects of the built environment—provides many similar opportunities. Commitments for accelerated electrification of vehicle fleets can be made contingent on accelerated decarbonization of TVA's generation assets. Because

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[18] *See* discussion *infra* Part III.

[19] *See* discussion *infra* Part II.

[20] *See* discussion *infra* Part III.

[21] For instance, the largest solar installations in the TVA service area have been made in response to demands by Facebook and Google, which insisted on renewable power from within the service area before they would locate major new facilities in the area. Heather Clancy, *Facebook Gets Specific About Its 100 Percent Renewables Target*, GREENBIZ, Aug. 30, 2018, https://www.greenbiz.com/article/facebook-gets-specific-about-its-100-percent-renewables-target-0; Dave Flessner, *Planning for the Future: TVA Seeks More Forms of Renewable Energy as Google, Facebook Buy 675 Megawatts of Solar Power*, CHATTANOOGA TIMES FREE PRESS, Apr. 2, 2019, https://www.timesfreepress.com/news/business/aroundregion/story/2019/apr/02/tvseeks-more-renewable-power/491816/.

[22] Many cities in the TVA service area are "blue dots in a red sea"—they reflect public support for climate mitigation and renewables that is not reflected in the actions of state governments in the region. *See 2016 District-by-District State Legislative Control*, NAT'L CONFERENCE OF STATE LEGISLATURES (Dec. 7, 2016), http://www.ncsl.org/research/elections-and-campaigns/district-by-district-state-legislative-control.aspx.

reduced demand is a substantial concern for TVA, it may be motivated by the potential for increased demand from electric vehicles. Although electricity use increased across the U.S. and the TVA service area for decades following World War II, in the last decade per capita household electricity use has leveled off and has begun to decline.[23] Much of this reduction has been attributed to the uptake of light-emitting diode ("LED") lightbulbs by households, but the TVA service area lags behind much of the nation in energy efficiency, and many additional steps are available to increase household, commercial, industrial, and other energy efficiency and conservation, further reducing TVA's demand.[24] In addition, the growth of battery and other storage technologies may make customer defection from the grid an increasing threat to TVA and other utilities.

The combination of decarbonization of the electric grid and electrification of vehicles and buildings can yield 60% or greater reductions in area carbon emissions. This combination is thus is an essential feature if the goal is to achieve the 80 by 50 pathway in the TVA service area. Electrification of the motor vehicle fleet will reduce carbon emissions, but the emissions reductions will be far greater if the grid is also decarbonized.[25] TVA has identified electrification of the motor vehicle fleet as its most important demand growth opportunity.[26] As a result of both TVA's interest in increasing demand via electrification of transportation and buildings and TVA's customers' interest in grid decarbonization, an opportunity exists for an agreement among TVA and its customers. In return for TVA's commitment to decarbonize electricity generation along an 80 by 50 pathway, TVA's major customers could commit to accelerate the uptake of electric vehicles via fleet purchases and other steps.

The TVA example highlights the importance of private governance options for other difficult-to-regulate organizations. For instance, many other major GHG sources in the U.S. Southeast are not subject to state

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[23] For a discussion of electricity demand, *see* Lucas W. Davis, *Evidence of a Decline in Electricity Use by U.S. Households*, 37 ECON. BULL. 1098, Part IV (2017).

[24] *See* Thomas Dietz, Gerald T. Gardner, Jonathan Gilligan, Paul C. Stern & Michael P. Vandenbergh, *Household Actions Can Provide a Behavioral Wedge to Rapidly Reduce U.S. Carbon Emissions*, 106 PROC. NAT'L ACAD. SCI. 18452 (2009).

[25] Joshua S. Graff Zivin, Matthew Kotchen & Erin T. Mansur, *Spatial and Temporal Heterogeneity of Marginal Emissions: Implications for Electric Cars and Other Electricity-Shifting Policies*, 107 J. ECON. BEHAV. & ORG. 248 (2014) (stating that in the average electric grid, an electric vehicle generates fewer carbon emissions than a fossil fuel vehicle). For a discussion of the importance of combining decarbonization of the electric grid with electrification of the transportation and building sectors, see Michael P. Vandenbergh & Jonathan M. Gilligan, *Forks in the Road*, 31 DUKE ENVTL. L. & POL'Y F. (forthcoming 2020).

[26] *See* TVA 2019 IRP, *supra* note 17.

government pressure, and the region would be the world's sixth largest emitter of CO_2 if it were a country.[27] Similarly, many utilities in the Midwest and Mountain West also face limited government pressure to decarbonize. Sources located in countries that are not pursuing climate mitigation are also promising targets for private governance initiatives, as are global shipping and aviation.[28]

The Article begins in Part I by exploring the basis for concluding that the 80 by 50 goal is necessary for reducing the risk of catastrophic climate change. Part II then explores why governments are unlikely to require TVA to accelerate its decarbonization in the near term. The Article turns in Part III to private governance initiatives. It begins with an analysis of the private sector pressure on TVA to supply low-carbon power, including commitments that signal an interest in decarbonization by bondholders, current and new corporate customers, large institutional customers, and households. It then examines pressure for decarbonization arising from demand-related issues and explores the possibility of connecting TVA's interest in increasing demand with its customers' interest in decarbonization. The Article concludes by suggesting that private governance initiatives also may be valuable for other difficult-to-regulate organizations.

I. WHY DEEP DECARBONIZATION?

Putting aside responsibility for past emissions, TVA's regulatory status raises climate mitigation concerns if its emissions pathway exceeds its fair share of the reductions necessary to achieve the widely accepted climate 2°C goal adopted in the Paris Agreement. This Part explores the basis for the widespread adoption of this deep decarbonization goal, identifies the emissions pathway necessary to achieve it, and demonstrates that the likely emissions pathway for TVA substantially exceeds the 80 by 50 pathway after 2030.

A. The Deep Decarbonization Goal and Emissions Pathways

The Paris Agreement included a target of limiting the increase in global average temperature to no more than 2°C over preindustrial levels, and this target has been widely adopted by national and subnational

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[27] U.S. ENERGY INFO. ADMIN., ENERGY-RELATED CARBON DIOXIDE EMISSIONS BY STATE, 2005–2016 (2019), https://www.eia.gov/environment/emissions/state/analysis/pdf/stateanalysis.pdf.

[28] *See* Michael P. Vandenbergh & Daniel J. Metzger, *Private Environmental Governance: The Case of Aviation*, 30 FORDHAM ENVTL. L. REV 62 (2018).

governments, corporations, and other organizations.[29] No one target has been identified as a safe level of temperature increase, but climate scientists have indicated that as temperatures increase above 1.5 to 2°C, steep increases occur in the risk of feedback effects: adverse weather events, sea level rise, species loss, and threats to human health, security, food systems, water supply, and economic growth.[30] In other work, one of us has analogized exceeding the 2°C goal to driving a car in the red zone on a tachometer; doing so does not guarantee engine failure, but the chance that it will occur increases sharply.[31]

Many different emissions reduction pathways could reduce the risk of exceeding the 2°C target,[32] but economy-wide emissions pathways consistent with averting the 2°C level of warming require net-zero global emissions by at least the year 2070.[33] In addition, these pathways require the U.S. and other developed countries to reduce overall GHG emissions by at least 80% from 1990 levels by 2050.[34] These reductions will require systemic changes to the American energy economy, collectively termed "deep decarbonization": highly efficient use of energy across economic sectors, almost complete decarbonization of the electricity grid, significant decarbonization of other energy sources, and fuel switching to electricity and other low-carbon energy supplies for vehicles and buildings.[35]

To reach the 80% economy-wide emissions reduction goal by 2050, the American energy system will require continuous transformation over

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[29] For an overview, *see* GERRARD & DERNBACH, *supra* note 16. *See also What is a science-based target?*, SCIENCE BASED TARGETS, https://sciencebasedtargets.org/what-is-a-science-based-target/ (last visited Oct. 13, 2019); *"We Are Still In" Declaration*, WE ARE STILL IN, https://www.wearestillin.com/we-are-still-declaration (last visited Oct. 13, 2019); *States United for Climate Action*, U.S. CLIMATE ALLIANCE, https://www.usclimatealliance.org/ (last visited Oct. 13, 2019); *The Paris Agreement*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement (last visited April 20, 2020, 11:20 AM). Roughly 180 countries have adopted the goal of keeping global warming "well below" a 2°C increase over pre-industrial levels and to pursue efforts to limit the increase to 1.5°C.

[30] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, GLOBAL WARMING OF 1.5°C (Valérie Masson-Delmotte et al. eds., 2019), at Technical Summary, https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf [hereinafter GLOBAL WARMING OF 1.5°C].

[31] VANDENBERGH & GILLIGAN, BEYOND POLITICS, *supra* note 4, at ch. 2.

[32] JAMES H. WILLIAMS ET AL., PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES U.S. 2050 VOL. 1 TECHNICAL REPORT (rev. with technical supplement 2015), http://deepdecarbonization.org/wp-content/uploads/2015/11/US_Deep_Decarbonization_Technical_Report.pdf [hereinafter PATHWAYS TO DEEP DECARBONIZATION].

[33] GLOBAL WARMING OF 1.5°C, *supra* note 30, at ch. 2.

[34] PATHWAYS TO DEEP DECARBONIZATION, *supra* note 32.

[35] *Id.*

the next three decades. According to the U.S. Deep Decarbonization Pathways Project ("DDPP"), a leading framework for evaluating decarbonization options, the baseline ("mixed case") trajectory consistent with this goal requires economy-wide U.S. emissions reductions of at least 80% by 2050 (from 2005 levels).[36] This trajectory also requires fossil fuel-based electricity generation to gradually decline through 2050 and remaining coal plants to be retired by the late 2030s. This pathway is consistent with the Obama Administration's since-revoked commitment to reduce total U.S. GHG emissions to 26–28% below 2005 levels by 2025.[37] Although the Trump Administration has withdrawn from the Paris Agreement and has backtracked on the regulatory measures designed to achieve interim U.S. emissions reduction targets, many other governments and private organizations have adopted the 2°C goal or emissions reduction targets consistent with the goal. Examples include major national governments around the world and many U.S. states and cities, as well as hundreds of global corporations.[38] Many of these commitments have been made through the Science-Based Targets Initiative, which supports efforts by corporations and other organizations to adopt targets consistent with limiting global warming to 1.5°C or 2°C.[39]

Although policy debates often focus on the reductions necessary by 2050, actions before 2050 are important. Maintaining high emissions levels over the next several decades with a steep reduction immediately before 2050 will not achieve the 2°C goal. In addition to the 80% reductions required by 2050, the DDPP deep decarbonization trajectory requires U.S. emissions reductions from 2005 levels of at least 35% by 2030, 45% by 2035, and 65% by 2040.[40] Achieving the 2050 goal will require major transformation of infrastructure, land use, industrial systems, and energy systems, which will become more difficult and costly if intermediate targets are not achieved. Global decarbonization pathways require near-term changes to avoid cost escalation, stranded assets, and reduced response flexibility in the long term. In addition, because carbon dioxide has long residence times in the atmosphere, the level of emissions between now and 2050 will affect global atmospheric concentrations, temperatures, and the amount of post-2050 emissions reductions and carbon removal required to meet the 2°C goal. Even with deep decarbonization efforts between now and 2050, scientists have

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[36] *Id.*

[37] *Id.* at 72.

[38] *See What is a science-based target*, *supra* note 29.

[39] *Id.*; *"We Are Still In" Declaration*, *supra* note 29; *States United for Climate Action*, *supra* note 29.

[40] PATHWAYS TO DEEP DECARBONIZATION, *supra* note 32.

concluded that carbon dioxide removal will be a necessary component of climate change mitigation due to temperature rises that have already been locked in due to inaction.[41]

The fact that achieving the 2050 goal will become much more difficult and costly if intermediate targets are not achieved is particularly important for the electric utility industry. One essential constraint on utilities is infrastructure turnover; electric power plants and industrial boilers, for instance, will likely be replaced only once before 2050.[42] If utilities continue to invest in high-carbon generation capacity, this could create "infrastructure inertia" that will result in high costs from retrofits and early retirements that will be required to achieve decarbonization.[43] In addition, because limiting climate change requires limiting cumulative carbon emissions,[44] delaying decarbonization increases the reductions necessary to achieve equal results. As a result, a comparable decarbonization effort beginning in 2040 not only would be more costly than an effort begun in 2020, but also would require reducing emissions by more than 80% by 2050.

The changes required to achieve deep decarbonization have major implications for TVA and other electric utilities. As vehicle and building electrification progresses, electric utilities could see demand approximately double by 2050, while also being called upon to sharply reduce the carbon intensity of electricity production.[45] Although efficiency and conservation measures are predicted to reduce electricity demand in some cases, demand increases will be driven by uptake of electric vehicles—expected to account for 9% of global electricity demand by 2050[46]—and by switching to electricity use in appliances and other building systems—expected to account for an increased share of global electricity demand by 2050.[47] In addition, new electricity demand may arise from increasing fuel production from electricity (e.g., hydrogen fuel cells).[48]

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41 GLOBAL WARMING OF 1.5°C, *supra* note 30, at Technical Summary.

42 PATHWAYS TO DEEP DECARBONIZATION, *supra* note 32.

43 *See* Christopher Serkin & Michael P. Vandenbergh, *Prospective Grandfathering: Anticipating the Energy Transition Problem*, 102 MINN. L. REV. 1019, 1075–76 (2018).

44 GLOBAL WARMING OF 1.5°C, *supra* note 30, at ch. 2.

45 PATHWAYS TO DEEP DECARBONIZATION, *supra* note 32.

46 BLOOMBERG NEF, NEW ENERGY OUTLOOK 2018 (2018), https://bnef.turtl.co/story/neo2018.

47 *Id.*

48 PATHWAYS TO DEEP DECARBONIZATION, *supra* note 32.

1. Implications for TVA

Drivers of electric utility transformation include not only government regulation, but also economic and social pressure from customers, investors, lenders, insurers, employees, non-governmental organizations ("NGOs"), and other stakeholders. Prices of photovoltaic modules, wind turbines, and lithium-ion batteries have fallen in the last decade and are expected to continue to decline, driving utilities to switch from carbon-intensive energy generation to renewables.[49] In addition, regulation will likely play a significant role over the long term, even if near-term regulatory developments are uncertain. Utility investments account for decadal time spans, and utilities may assume that U.S. policy makers ultimately will adopt measures to "ensure that regulatory signals to network providers [utilities] related to procurement, rate-making, and cost allocation are consistent with deep decarbonization."[50] Utilities thus may be subject to a combination of long-term regulatory pressure along with many of the same social and economic pressures that are driving corporations and other private organizations to decarbonize in the near term.[51]

Despite the lack of near-term pressure from regulators at the federal level and in many states, a substantial number of utilities have committed to emissions pathways that meet or exceed the 80 by 50 pathway, as Table 1 shows.[52] In 2018, Minnesota-based Xcel Energy, one of the country's largest electric utilities, became the first to commit to carbon neutrality, and others[53] have since followed suit.[54] In 2018, coal-heavy Consumers

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[49] BLOOMBERGNEF, *supra* note 46.

[50] JAMES H. WILLIAMS ET AL., POLICY IMPLICATIONS OF DEEP DECARBONIZATION IN THE UNITED STATES US 2050 VOL. 2 POLICY REPORT 11 (2015), http://usddpp.org/downloads/2015-report-on-policy-implications.pdf.

[51] VANDENBERGH & GILLIGAN, BEYOND POLITICS, *supra* note 4, at ch. 4.

[52] Sophia Ptacek & Sheryl Carter, *More Utilities Make Big Commitments to Climate Action*, NATURAL RESOURCES DEFENSE COUNCIL (Mar. 5, 2019), https://www.nrdc.org/experts/sophia-ptacek/more-utilities-make-big-commitments-climate-action.

[53] These include Austin Energy, Avista, Green Mountain Power, Hawaiian Electric, Idaho Power Public Service Enterprise Group, New York Power Authority, Platte River Power Authority, *see infra* notes 54 & 57.

[54] *See* XCEL ENERGY, DESTINATION 2050 BUILDING THE FUTURE (2018), https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Corporate%20Responsibility%20Report/CRR-carbon-free-future.pdf (noting that Xcel had committed to "provide customers with 100% carbon-free electricity by 2050 and to reduce carbon emissions by 80% by 2030 from the electricity that serves our customers"); Emily Kaldjian & Priya Barua, *The US Underwent a Quiet Clean Energy Revolution Last Year*, WORLD RESOURCES INSTITUTE (Jan. 23, 2019), https://www.wri.org/blog/2019/01/us-underwent-quiet-clean-energy-revolution-last-year; Dave Kovaleski, *PSEG launches plan to achieve net-zero carbon emissions by 2050*, DAILY ENERGY INSIDER (July 26, 2019), https://dailyenergyinsider.com/news/20760-pseg-launches-plan-to-achieve-net-zero-carbon-emissions-by-2050/.

Energy in Michigan announced its intent to phase out its use of coal and cut emissions by 80% by 2040. A review of investor-owned Midwest utilities found that more than 75% have set renewables or emissions goals beyond their statutory obligations.[55] Not all utilities are on this track, but as of mid-2019, at least nine of the twenty largest publicly traded U.S. power producers have made long-term decarbonization commitments.[56]

Table 1: Utility Decarbonization Commitments[57]

Utility	Goal	Date
AEP Ohio	80% emissions reduction from 2000 levels	2050
Armeren	80% emissions reduction from 2005 levels	2050
Austin Energy	Zero carbon energy	2050
Avangrid	Carbon neutral	2035
Avista	100% carbon free	2045
Consumers Energy	80% emissions reduction	2040
CMS Energy Corporation	80% emissions reduction and coal-free	2040
CPS Energy	80% non-emitting energy sources	2040
DTE Energy	80% emissions reduction	2040
First Energy	90% emissions reduction from 2005 levels	2045
Green Mountain Power	100% carbon free (2025) and 100% renewable energy	2030

[55] CLIMATE MAJORITY PROJECT, NET-ZERO BY 2050 (2019), https://static1.squarespace.com/static/5c33155fec4eb7e2b8479aeb/t/5c77b5bbe4966bf9556f1554/1551349208857/net-zero-report.pdf.

[56] *Utility Carbon Reduction Tracker*, SMART ELECTRIC POWER ALLIANCE, https://sepapower.org/decarbonization-tracker/ (last visited Oct. 13, 2019).

[57] *See* Kaldjian & Barua, *supra* note 54; Sven Berg, *Idaho Power sets goal for 100-percent clean energy by 2045*, IDAHO POWER (Mar. 26, 2019), https://www.idahopower.com/news/idaho-power-sets-goal-for-100-percent-clean-energy-by-2045/; CLIMATE MAJORITY PROJECT, *supra* note 55; Kovaleski, *supra* note 54.

Hawaiian Electric	100% carbon neutral and 100% renewable energy	2045
Idaho Power	100% clean energy	2045
LADWP	100% coal free	2025
Madison Gas and Electric	Net zero carbon electricity	2050
National Grid	80% emissions reduction from 1990 levels	2050
NYPA	100% carbon free electricity	2040
NIPSCO	92% emissions reduction from 2005 levels	2028
NiSource Inc	100% coal free	2018
Platte River Power Authority	100% carbon free energy	2030
PNM	100% emissions free energy	2040
Portland General Electric	80% reduction of GHG emissions	2050
Poudre Valley REA	80% carbon free energy	2030
PSEG	Net zero carbon emissions	2050
WEC Energy	80% emissions reductions from 2005 levels	2050
Xcel Energy	Zero carbon energy	2050

In contrast, although TVA has reduced its carbon intensity by over 50% since 2005, it has not committed to achieve an emissions pathway consistent with the 2°C goal, and it plans little change in its mix of coal, natural gas, and renewable power over the next twenty years. In 2019, TVA finalized an IRP through 2038.[58] Although TVA has left the door open for incremental decarbonization by declining to identify a particular resource strategy, its business-as-usual strategy—which "reflect(s) decisions made to date by the TVA Board of Directors" and "is the most economic and has the lowest average cost and risk exposure"—would increase TVA's share of carbon-free energy (nuclear, hydroelectric, and renewables) from 53% in 2018 to just 58% in 2038, based on its current economic and technological outlook.[59] In the 2019 IRP, TVA notes that its share of carbon-free energy could climb to 75% in 2038 if technology

[58] TVA 2019 IRP, *supra* note 17.

[59] *Id.*

advances quickly and consumer preferences shift, but it also indicates that its share could fall as low as 45% if the Tennessee Valley experiences strong migration and economic growth. Under this base strategy and TVA's current economic and technical outlook, TVA expects coal to provide 16% and natural gas to contribute a further 24% of its energy in 2038.[60]

TVA's IRP does not compare its projected GHG emissions to any target, but it is possible to construct a TVA pathway from its base case and to compare that pathway to the target pathway charted for U.S. utilities by the DDPP. As Figure 1 suggests, by 2030 TVA's trajectory would place it far away from the generation mix necessary for the deep decarbonization pathway, which requires U.S. utilities to entirely eliminate coal in the 2030s and to limit natural gas and other fossil fuels to less than 13% of total electric generation by 2050.[61]

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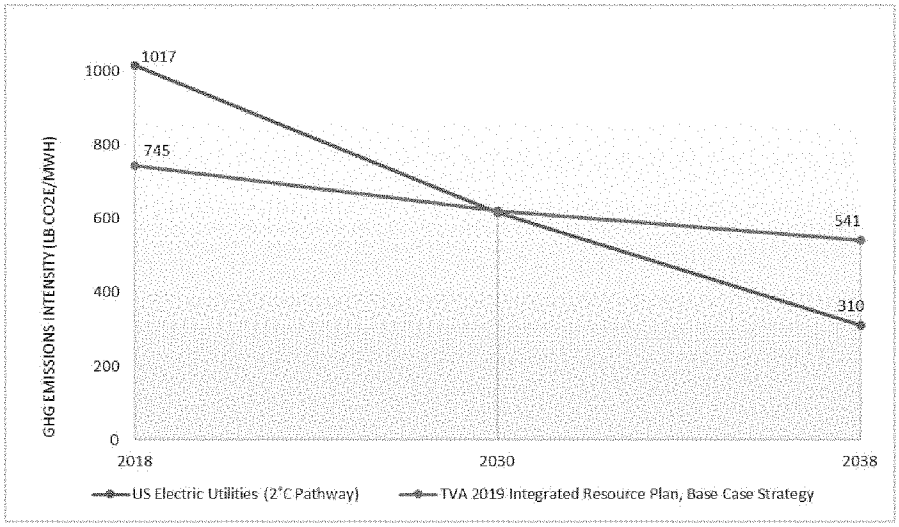
[60] *Id.*

[61] PATHWAYS TO DEEP DECARBONIZATION, *supra* note 32.

Figure 1: GHG Emissions Intensity of TVA Electricity[62]



[62] The U.S. Electric Utilities pathway reflects the Mixed Case scenario provided in the *Pathways to Deep Decarbonization in the United States US 2050 Vol. 1 Technical Report*, assembled by the DDPP. The TVA pathway reflects the linear pathway between its 2018 generation portfolio (as provided online at "TVA: Our Power System") and the generation portfolio that would result from the Base Case strategy and Current Outlook scenario provided in the 2019 Integrated Resource Plan. Though TVA did not explicitly select the Base Case strategy for its generation future, it has indicated that this strategy "reflect(s) decisions made to date by the TVA Board of Directors" and "is the most economic and has the lowest average cost and risk exposure" among its strategies. *Id.* at 9-4. By declining to choose a particular strategy, TVA can publicly hold out the option of significant decarbonization, even if it does not pursue it. The principal regional news article on the IRP leads by touting the possibility that TVA will add "up to 14 GW of solar generation by 2038." *Id.* Although this possibility falls within TVA's sensitivities, it is not representative of any of the 30 outcomes TVA analyzes in the IRP, the most ambitious of which would increase the system's renewable capacity (solar and wind) by 6.2 GW. *Id.* at G-11. Part of this discrepancy is attributable to confusing terminology—while TVA's IRP generally refers to capacity additions in terms of Summer Net Dependable (SND) capacity, it presents wind and solar capacity additions in terms of nameplate capacity, which dwarf the SND capacity of these resources by as much as 300-400%.

Compared to the DDPP's utility trajectory, which is consistent with limiting global warming to 2°C, TVA's GHG emissions intensity will fall behind targeted levels before 2030, and by 2038 will be 74% higher than the utility target. Similarly, although TVA currently provides more than the targeted share of its electricity from carbon-free sources (largely due to its significant nuclear and hydroelectric resources), it will fall significantly behind before 2038 if it follows the base case trajectory suggested in its IRP. Even under the most ambitious strategy addressed in the IRP, TVA's emissions intensity would be 13% above the target in 2038. We discuss the implications of this carbon intensity deficit—the gap between TVA's emissions pathway and the pathway necessary for deep decarbonization—in Parts II and III below.

TVA also faces two other potential shortfalls: a gap between its emissions and the emissions of many competing utilities and a gap between its renewable power generation and the commitments of many of its major customers. As discussed above, almost half of the major utilities have committed to decarbonization pathways, and recent trends have been toward additional commitments even as the federal government has backed off of GHG emissions requirements. If the utilities meet their commitments, the result will be that TVA's electric grid will have a higher carbon intensity by 2030 than the grids of many other regions that compete for economic activity. As to renewables, many states, cities, and major utility customers are insisting not just on clean or low-carbon power, which in some cases can include nuclear and large hydropower projects, but also renewable power from sources such as wind and solar. TVA reports that its current power generation includes only 3% renewable power (other than hydroelectric), which is substantially below the average[63]—much less the top third—of utilities, and future projections are even more problematic given the widespread commitments of other utilities.[64] According to TVA's 2019 IRP, TVA may increase renewable power "up to 14,000 megawatts," but it has not announced a plan to do so.[65] In fact, TVA has made no public commitment to increase its overall use of renewable power, although as discussed in Part III it has taken some promising steps in the last year. TVA thus faces not only a deficit in the carbon intensity of its grid compared to the deep decarbonization pathway and the likely pathway of

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[63] According to EIA, wind, solar, and other non-hydro renewables provided 9% of total utility-scale generation in 2018. *See* U.S. ENERGY INFORMATION ADMINISTRATION, SHORT-TERM ENERGY OUTLOOK (2020), https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf.

[64] TVA 2019 IRP, *supra* note 17.

[65] *Id.*

the utilities in many competing areas, but also a renewable power deficit, which we also discuss below.

II. PUBLIC GOVERNANCE OF DIFFICULT-TO-REGULATE ENTITIES: THE CASE OF TVA

After identifying an environmental problem, the standard public governance model asks, "What can government do?"[66] Part II explores the answer to this question and concludes that with the deregulatory activities underway at the federal level and opposition to climate mitigation among several of the states in the TVA service area, the answer is "Not much."[67] This Part reviews the unusual legal and regulatory status of TVA and why that institutional status, in combination with political retrenchment at the federal and state levels, has insulated TVA from many of the pressures that have affected other large sources of GHG emissions in the U.S. electric power sector. This Part also notes two potential exceptions to the dim prospects for government action: climate mitigation actions by states outside the TVA service area and by cities within the area.

A. What is TVA?

Governance. On May 18, 1933, President Roosevelt signed the Tennessee Valley Authority Act into law.[68] President Roosevelt had asked Congress to create "a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise."[69] Congress responded by creating TVA—a "wholly owned public corporation of the United States"—to promote the Tennessee Valley's economic development.[70] Congress charged TVA with

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[66] *See* VANDENBERGH & GILLIGAN, BEYOND POLITICS, *supra* note 4, at ch. 3 (discussing the tendency to ask "What can government do?").

[67] *See, e.g.*, ROBERT PERCIVAL, CHRISTOPHER H. SCHROEDER, ALAN S. MILLER & JAMES P. LEAPE, ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY (7th ed. 2013) (addressing private sector initiatives in the last chapter and expressing skepticism about private governance).

[68] TENN. VALLEY AUTH., TVA STATEMENT ON CLIMATE CHANGE ADAPTATION (2011). TVA may be best known to law students as the institution that was at the center of the conflict between the snail darter and a dam in the leading Endangered Species Act case, Tenn. Valley Auth. v. Hill, 437 U.S. 153 (1978).

[69] Message from President Franklin D. Roosevelt to Congress Suggesting the Tennessee Valley Authority (Apr. 10, 1933) (on file with the Franklin D. Roosevelt Presidential Library and Museum) http://docs.fdrlibrary.marist.edu/odtvacon.html. For a review of the functioning and accountability of TVA, see ERWIN C. HARGROVE, PRISONERS OF MYTH: THE LEADERSHIP OF THE TENNESSEE VALLEY AUTHORITY, 1933-1990 (1994).

[70] Tenn. Valley Auth. v. Hill, 437 U.S. 153, 157 (1978).

improving the quality of life in the Tennessee Valley region through the integrated management of the region's resources.[71]

At first, TVA focused on reforestation, improving fertilization of agricultural properties, and building dams,[72] but soon after its formation TVA began constructing new power plants for the region. Over time, TVA devoted more of its efforts to producing and selling electric power under the TVA Act's direction "[to] produce, distribute, and sell electric power"[73] in connection with TVA's responsibility to improve navigable rivers and to provide for the national defense.[74] Congress also provided TVA with the implied power to dispose of surplus energy.[75]

In many respects, TVA functions much like a typical private electric utility. The TVA Act provides TVA with the exclusive right to produce and sell, and an obligation to provide, electricity to customers in its seven state service region.[76] The TVA Act also provides TVA with a range of powers typically reserved for the government,[77] such as eminent domain.[78] TVA acts in some cases as an independent non-governmental party, exercising the power to sue and be sued in its corporate name.[79] In other cases, it functions more like a government agency; until recently TVA received appropriations from the U.S. Treasury, and it does not have equity shareholders. As we discuss in more detail below, though, it does issue publicly-traded debt and files periodic disclosures with the Securities and Exchange Commission ("SEC").[80] Despite the fact that it can sue and be sued in its corporate capacity, courts have concluded that TVA is a governmental agency of the U.S. and is largely free from state regulation or control, except as Congress may otherwise consent.[81]

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71 TVA STATEMENT ON CLIMATE CHANGE ADAPTATION, *supra* note 68.

72 Thacker v. Tenn. Valley Auth., 139 S.Ct. 1435, 1439 (2019).

73 16 U.S.C. § 831d(l) (2019); *see also* Memphis Power & Light Co. v. City of Memphis, 112 S.W.2d 817, 822 (Tenn. 1937) (stating that "[t]he TVA is a public instrumentality and holds the electric energy generated at its dams in trust for the people of the whole country"). Because the United States is a government of enumerated powers, any power must be conferred in express terms or by necessary implication by the Constitution. Ashwander v. Tenn. Valley Auth., 8 F. Supp. 893, 895 (N.D. Ala. 1934).

74 *Ashwander*, 8 F. Supp. at 895.

75 *Id.*

76 *Thacker v. Tenn. Valley Auth.*, 139 S.Ct. 1435 (2019).

77 *Id.*; 16 U.S.C. § 831c-3(a); Mays v. Tenn. Valley Auth., 699 F. Supp. 2d 991, 995 (2010) (through amendments to the TVA Act, Congress extended TVA's purposes to "law enforcement . . . in the area of jurisdiction."). Another example of a way that TVA acts like a government agency is that if the TVA is negligent in a governmental nature, a court may decide that an implied limitation bars a negligence suit. However, the TVA is not immune from all suits, if a suit challenges any of its commercial activities.

78 16 U.S.C. §§ 831c(h)-(i); *Mays*, 699 F. Supp. 2d at 995.

79 *Mays*, 699 F. Supp. 2d at 1006.

80 Posey v. Tenn. Valley Auth., 93 F.2d 726, 727 (5th Cir. 1937).

81 *Id.*

Unlike most other utilities, however, TVA faces some federal statutory constraints on its operations. First, the 1959 amendments to the TVA Act established what is known as the "TVA fence," which prohibits TVA from using bond financing to produce electricity to sell outside of its congressionally mandated territory.[82] As a result, although TVA purchases some of its power from other utilities,[83] it is unable to sell its electricity into the wholesale market, unlike other utilities. Second, the Energy Policy Act of 1982 created an "anti–cherry picking" requirement that exempts TVA from Federal Energy Regulatory Commission orders requiring utilities to provide transmission access to other companies.[84] As a result, TVA does not sell power into wholesale power markets, nor do its wholesale customers (primarily local distribution utilities) typically have the option to buy power from other suppliers in the interstate market, as do wholesale customers elsewhere in the U.S.[85]

TVA was inspired by the New Deal public power ideal of customer control, but in practice it is largely insulated from the forms of democratic control that most energy firms in the U.S. face. Its board is appointed by the president and confirmed by the Senate, but long, staggered terms for board members result in limited executive branch control through the appointments process.[86] Originally, TVA had a three-member full-time board, but the structure changed in 2004 to nine part-time members with staggered terms.[87] Board members each serve a term of five years.[88] The

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[82] 16 U.S.C. § 831n-4(a).

[83] During the 2018 fiscal year, TVA's power sales included about 13% of purchased power from other electric power suppliers, based on kwh. *See* TENN. VALLEY AUTH., ANNUAL REPORT (FORM 10-K) 13 (Nov. 15, 2018), https://sec.report/Document/0001376986-18-000046/tve-10xk09302018.htm [hereinafter TVA 2018 10-K].

[84] 16 U.S.C. § 824k(j).

[85] As TVA itself reports, "TVA provides electricity in a service area that is largely free of competition from other electric power providers based on the provisions of the TVA Act." TVA 2018 10-K, *supra* note 83, at 19.

[86] See HARGROVE, *supra* note 69.

[87] As soon as practicable after the enactment of the Appropriations Act of 2005, the President was to submit to the Senate nominations of six persons to serve as members of the Board of Directors (the Board) of the TVA in addition to the members serving on the date of enactment of the act. 108 Pub. L. 447 (2004) ("(A) two members for a term to expire on May 18, 2007; (B) two members for a term to expire on May 18, 2009; and (C) two members for a term to expire on May 18, 2011.").

[88] A member of the Board whose term has expired may continue to serve after the expiration until a successor takes office, except that the member shall not serve beyond the end of the session of Congress in which the term of the member expires. A member appointed to fill a vacancy on the Board occurring before the expiration of the term for which the predecessor the member was appointed was to be appointed for the remainder of that term. 16 U.S.C. § 831a(a); 16 U.S.C. § 831a(d)(1).

chief executive has the power of removal, although it is rarely exercised.[89] The effect of the staggered board appointments, Senate confirmation, and executive branch involvement principally through the budget process leaves TVA only indirectly subject to control by the executive branch, and much of the potential democratic control is exercised opaquely through involvement in the board appointments process and other interventions by members of Congress from the TVA service area.[90] Moreover, unlike most utilities, TVA's power resource decisions (such as its construction of new plants) and its retail transactions, including its rates, are not controlled by state utility regulators.

Electricity Generation and Distribution. TVA sells power produced from nuclear power plants, hydroelectric facilities, gas-fired facilities, and coal-fired units.[91] Based on its recent reports of generation capacity, the relative contributions from these sources are 37% nuclear, 24% coal, 20% natural gas, 9% hydro, and 3% solar and wind.[92] TVA sells power directly to a small group of large industrial customers, but most of its power is sold to 154 regional distribution utilities, which purchase power wholesale from TVA and then sell the power to industrial, commercial, non-profit, household, and other retail users. The seven largest distributors serve the largest metropolitan areas in the TVA service area. These large distributors (e.g., Memphis Light, Gas and Water; Nashville Electric Service) are quasi-governmental entities that are indirectly controlled by the municipal governments in the regions they serve. In addition, the network of local distributors includes several rural electric cooperatives.[93] The retail sales of TVA's distribution utilities are not controlled by state utility regulators, who are relegated to a bystander role in decisions about power resources and retail rates.

The existence of local electric distribution utilities complicates the relationships between the local governments and TVA. Unlike many cities elsewhere, municipal governments in the TVA service area have an electric distribution organization that is loosely affiliated with the city

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[89] Morgan v. Tenn. Valley Auth., 28 F. Supp. 732, 737 (E.D. Tenn. 1939). The enacting authority of the TVA shows no legislative intent to limit the power of the executive with respect to removal, and in the absence of such intent, the power exists. *Id.*

[90] ENVTL. INTEGRITY PROJECT, OUTSIDE THE LAW: RESTORING ACCOUNTABILITY TO THE TENNESSEE VALLEY AUTHORITY (Dec. 2009), https://www.environmentalintegrity.org/wp-content/uploads/2016/11/2009-12_Outside_the_Law.pdf.

[91] TVA 2018 10-K, *supra* note 83, at 38.

[92] *Id.* at 42 (describing assets); *see also TVA at a Glance*, TENN. VALLEY AUTH., https://www.tva.gov/About-TVA/TVA-at-a-Glance (describing capacity output of various forms of generation).

[93] For a discussion of efforts to decarbonize rural electric cooperatives, see Gabe Pacyniak, *Greening the Old New Deal: Reforming Rural Electricity Cooperative Governance*, 85 MO. L. REV. (forthcoming 2020).

government. These distribution utilities have long-term contractual commitments to acquire their power from TVA and have close working relationships with TVA. In addition, they rely on the revenues from the sale of electricity to pay employees and fund other activities. As a result, each city within the TVA service area is not just a customer and regulator of an electric utility, but also has something approximating an ownership interest in an electric utility.

In terms of retail customers, TVA's organic statute encourages it to structure its power generation to enable it to provide power "at the lowest possible rates" to domestic and rural customers, including industrial customers.[94] This could be a barrier to decarbonization if "cost" is construed narrowly to exclude environmental costs, but the term has been construed broadly by courts.[95] In addition, the least cost provision could be a prompt to increase renewable or clean energy if renewable or clean electricity is less costly than fossil fuel-based electricity.[96] In some situations and some areas of the U.S., the marginal cost of operating a wind or solar facility is less than the marginal cost of operating a coal-fired facility.[97] Trends in the cost of electric power generation thus may increase pressure for adoption of low-carbon and renewable power generating units. A 2017 report by the International Renewable Energy Agency states that "by 2020, all the renewable power generation technologies that are now in commercial use are expected to fall within

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[94] Tennessee Valley Authority Act of 1933, 48 Stat. 58 (1933) (codified at 16 U.S.C. § 831j) ("This policy is further declared to be 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 the domestic and rural consumers to whom the power can economically be made available, and accordingly 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 manner as to encourage increased domestic and rural use of electricity.").

[95] *See* Tennessee Valley Authority Act of 1933, 48 Stat. 58 (1933) (codified at 16 U.S.C. §§ 831-831ee). The Energy Policy Act adopted language about a "least cost planning process" that provides flexibility to account for environmental issues in electricity planning decisions, 16 U.S.C.S. § 831m-1, and recent federal court decisions have interpreted the cost provision broadly. Ky. Coal Ass'n, Inc. v. Tenn. Valley Auth., 804 F.3d 799, 802–03 (6th Cir. 2015); Ky. Coal Ass'n, Inc. v. Tenn. Valley Auth., 68 F. Supp. 3d 685 (W.D. Ky. 2014).

[96] In 2005, Congress also adopted language requiring that board members: "shall affirm support for the objectives and missions, of the Corporation, including being a national leader in technological innovation, low-cost power, and environmental stewardship." Consolidated Appropriations Act, 2005, 108 Pub. L. 447, 118 Stat. 2809 (2005). This section of the TVA's authority was added as part of the 2005 Appropriations Act. Consolidated Appropriations Act, 108 Pub. L. 447, 118 Stat. 2809 (2005). *See* 16 U.S.C. § 831a (language added in the 2005 Appropriations Act).

[97] *See* LAZARD, LAZARD'S LEVELIZED COST OF ENERGY ANALYSIS—VERSION 12.0 (Nov. 2018), https://www.lazard.com/media/450784/lazards-levelized-cost-of-energy-version-120-vfinal.pdf.

the fossil fuel-fired cost range, with most at the lower end or undercutting fossil fuels."[98]

Securities Disclosures. TVA issues publicly-traded debt and files periodic reports with the SEC that disclose financial risks to bondholders.[99] TVA's 2018 annual report (known as a 10-K) discloses several risk factors that are particularly relevant to its motivations to decarbonize. For instance, TVA discloses that it faces financial risks from "[s]ignificant reductions in demand for electricity produced through non-renewable or centrally located generation sources that may result from, among other things, economic downturns, increased energy efficiency and conservation, increased utilization of distributed generation and microgrids, and improvements in alternative generation and energy storage."[100] The annual report acknowledges that overall trends toward renewable energy (including wind turbines, solar cells, and distributed energy) have reduced the demand for traditional power and appear to be accelerating despite the absence of federal statutory or regulatory requirements or regulatory measures by the states in the Southeast.[101] According to the annual report, "[t]he traditional business model for power production, selling power from centrally located plants, is facing pressure from a variety of sources, including the potential for self-generation by current or potential customers, new technologies such as energy storage, and increased energy efficiency."[102]

The report also acknowledges the importance of consumer preferences that may push large businesses to focus on sustainability.[103] According to the report, while the anti-cherry-picking provision in federal law does not subject TVA to open-access transmission from other grids, TVA is not immune from customer pressures. According to TVA, consumers are becoming increasingly interested in generating their own power through "Distributed Energy Resources", which may cause TVA to re-evaluate the operation of its grid system.[104] In particular, the appeal of alternative technologies such as "large-scale energy storage, gas or wind turbines, fuel cells, microturbines, solar cells, and distributed energy or storage

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[98] INTERNATIONAL RENEWABLE ENERGY AGENCY, RENEWABLE POWER GENERATION COSTS IN 2017 19 (2018), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf [hereinafter IRENA REPORT].

[99] TVA 2018 10-K, *supra* note 83, at 38.

[100] *Id.* at 6 (noting factors that could affect TVA's forward-looking statements).

[101] *Id.*

[102] *Id.* at 41.

[103] *Id.*

[104] *Id.* at 19–20. TVA acknowledges that the increased use of Distributed Energy Resources will likely reduce its use of traditional generation resources. *See also id.* at 38-39.

resources" may allow effective competition with TVA's traditional power plants.[105] This may place pressure on TVA to "allow consumers to generate some of their own power requirements or purchase from other suppliers,"[106] and some customers may move to other providers entirely.[107] In its representations to investors, TVA thus recognizes that, despite the insulation provided by federal law, it is not immune from the pressures of private competition.[108]

TVA thus acknowledges that it will need to modify its offering mix of power generation to remain competitive if this loss of customers occurs.[109] TVA has indicated that it is adapting its generation mix to meet the growing need for electricity generated by renewable sources[110] and is evaluating smaller, cleaner power sources.[111] But its current "base case" yields a carbon trajectory that will be far above the requirements of deep decarbonization in the next two decades.[112] In addition, TVA's 10-K states that it has encouraged development of new energy and storage systems, such as solar, wind, biomass, and low-impact hydroelectric systems, across the Tennessee Valley through current and past offerings: "As of September 30, 2018, the combined participation for all such renewable solutions is approximately 450 MW of installed operating capacity with nearly 134 MW of additional approved capacity. Additionally, TVA contracts for approximately 1,215 MW of operating wind capacity from outside the Tennessee Valley via power purchase agreements."[113] For comparison, Georgia Power, which sells less electricity than TVA, has about 2,800 MW renewable capacity. As discussed in Part I, TVA's mix of generation sources has resulted in a carbon intensity that will be roughly in line with deep decarbonization over the next decade but will, without additional commitments, begin to exceed the deep decarbonization trajectory by 2030 and will be well above the trajectory by 2038.

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105 *Id.*

106 *Id.* at 39.

107 *Id.*

108 The annual report states that "other utilities may use their own transmission lines to serve customers within TVA's service area, and third parties are able to avoid the restrictions on serving end-use customers by selling or leasing generating assets to a customer rather than selling electricity. These threats underscore the need for TVA to strategically price its products and services and design rates to be competitive. There have also been some efforts in the past to erode the anti-cherry picking provision, and the protection of the anti-cherry picking provision could be limited and perhaps eliminated by federal legislation at some time in the future." *Id.* at 19.

109 *Id.* at 39.

110 *Id.* at 38.

111 *Id.* at 20.

112 *Id.*

113 *Id.*

B. The Prospects for National or Subnational Regulation

TVA has an unusual legal status that insulates it to some extent from democratic control over most of its energy investment, operation, and pricing decisions, but it is subject to typical federal environmental requirements. To a more limited extent, it is also subject to state and local environmental controls. Part II.B examines the extent to which the federal government or the states and cities in the TVA service area are likely to adopt laws, policies, and programs that will induce TVA to decarbonize more rapidly. It suggests that although the federal government and the TVA-area states are unlikely to generate substantial pressure on TVA in the near term, climate mitigation actions by states outside the TVA service area and by cities in the area may have some effect.

1. Federal Action

If we assume that responding to climate change is something that a democratically accountable national government would do, then the natural place to turn is to the federal legislative and executive branches. Bipartisan climate legislation was introduced by John McCain and Joe Lieberman in the 2000s, but it never gained traction in Congress,[114] and the Waxman-Markey cap-and-trade bill passed in the House of Representatives in 2009 but died in the Senate.[115] Recent legislative proposals have included a national carbon tax and the Green New Deal, but the near-term prospects for both look bleak. New legislation probably will require a supportive president, and the Iowa Electronic Market, a remarkably accurate predictor of many recent elections, suggests substantial uncertainty about the outcome in 2020.[116] In addition, legislation will require not only control of the House of Representatives by a party that places a high priority on climate mitigation, but 60 votes in the Senate to overcome a filibuster and 66 votes in the event of a presidential veto. The Senate barrier is perhaps the greatest of these hurdles. A recent study suggests that population shifts away from rural states have created a situation in which states with less than 20% of the US population control over 50 votes in the Senate, and the voters in many

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[114] Amanda Little, *The climate bill lost out, but the environment may yet prove the winner*, GRIST (Nov. 5, 2003), https://grist.org/article/thrill/.

[115] *Congress Climate History*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS, https://www.c2es.org/content/congress-climate-history/ (last visited Oct. 14, 2019).

[116] Cassie Philips, Jonathan M. Gilligan, Stephen Harper, Jackie Roberts, & Michael P. Vandenbergh, *Dialogue: Beyond Politics: The Private Governance Response to Climate Change*, 48 ENVTL. L. REP. 11049 (2018). For a discussion of election markets and climate change, see Michael P. Vandenbergh, Kaitlin Toner Raimi, & Jonathan M. Gilligan, *Energy and Climate Change: A Climate Prediction Market*, 61 UCLA L. REV. 1962 (2014).

of these states tend to oppose climate mitigation.[117] The current 5-4 divide in the Supreme Court suggests that climate legislative and regulatory measures will get a searching review by the Court, and if President Trump is reelected, the 5-4 split may easily expand to 6-3 or 7-2.[118]

The prospect of executive branch regulatory action also holds out limited hope for major climate mitigation measures. Comprehensive regulations that target greenhouse gases, mercury, and other pollutants under the Clean Air Act could reduce U.S. greenhouse gas emissions, as could a range of executive orders relating to reporting of greenhouse gas emissions, federal procurement of low carbon goods, and other issues. These measures could affect TVA by imposing direct emissions reduction requirements and by affecting the demand for low-carbon power from TVA's customers and investors. The regulatory rollbacks by the Trump administration, however, have demonstrated the vulnerability of executive branch actions. Although the 2020 election and increasing concern over climate control may prompt further federal regulation of TVA, it is unclear whether a new president of either party would pursue the regulatory measures necessary to achieve deep decarbonization and whether those regulatory actions would survive judicial review.

2. State Regulatory Actions

Roughly half of the states have taken major steps to reduce carbon emissions. For instance, at least twenty-four states have committed to policies that in the aggregate should reduce their emissions by 26–28% from 2005 levels by 2025 (consistent with the U.S. commitment to the Paris Agreement).[119] Together, these states represent 55% of the U.S. population and an $11.7 trillion economy.[120] In addition, the trend is toward more aggressive long-term commitments and actions. Four states (California, Washington, Hawaii, and New Mexico) have committed to 100% clean or renewable energy by 2050 or earlier,[121] and New York has committed to carbon neutrality by 2050, with a requirement of 70%

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117 *See* Orts, *supra* note 2.

118 *See* Paul Starr, *Trump's Second Term*, THE ATLANTIC (May 2019), https://www.theatlantic.com/magazine/archive/2019/05/trump-2020-second-term/585994/.

119 *States United for Climate Action*, *supra* note 29.

120 *2019 Fact Sheet*, U.S. CLIMATE ALLIANCE (2019), https://static1.squarespace.com/static/5a4cfbfe18b27d4da21c9361/t/5ccb5aa56e9a7f542fe4233c/1556830885910/USCA+Factsheet_April+2019.pdf.

121 Nathan Rott, *Going 'Zero Carbon' Is All The Rage. But Will It Slow Climate Change?*, NPR (June 18, 2019), https://www.npr.org/2019/06/18/724343789/going-zero-carbon-is-all-the-rage-but-will-it-slow-climate-change.

renewable electricity generation by 2030.[122] California has led the nation in its efforts to implement policies to achieve its climate goals, including a cap-and-trade program, automotive standards, and other measures.[123]

Yet with few exceptions, the states in the TVA service area have not pursued climate mitigation efforts. Several TVA-area states actively litigated to oppose the Obama-era Clean Power Plan.[124] North Carolina and Virginia are the only TVA-area states to join the U.S. Climate Alliance, [125] and only a small slice of TVA's service area is in these states.[126] Furthermore, North Carolina and South Carolina are the only states in the region with renewable portfolio targets. State targets serve an important symbolic role, but the TVA Act's preemption of state regulatory control over energy resource investments makes it unclear whether TVA would be required to comply with state targets that exceed its own voluntary goals.[127]

Although the state governments within the TVA service area are not a likely source of legislative or regulatory pressure for emissions reductions, the policies in states outside of the TVA service area may have important effects on TVA. States such as California or New York, for example, have challenged large corporations to apply more stringent regulatory requirements to their operations in other jurisdictions.[128] As the recent agreement by several automakers to voluntarily apply the California tailpipe standards nationwide suggests, corporations with national or global operations may choose to adopt California-compliant carbon emissions reductions strategies across all of their operations.

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[122] Jesse McKinley & Brad Plumer, *New York to Approve One of the World's Most Ambitious Climate Plans*, N.Y. TIMES (June 18, 2019), https://www.nytimes.com/2019/06/18/nyregion/greenhouse-gases-ny.html.

[123] *See* Ann E. Carlson, *The Trump Administration's Assault on California's Global Climate Leadership*, 112 *AM. J. INT'L L. UNBOUND* 269 (2018); Hiroko Tabuchi, *U.S. Climate Change Policy: Made in California*, N.Y. TIMES (Sept. 27, 2017), https://www.nytimes.com/2017/09/27/climate/california-climate-change.html.

[124] *Fifteen US States Seek to Block Obama's Clean Power Plan*, THE GUARDIAN (Aug. 14, 2015), https://www.theguardian.com/environment/2015/aug/14/fifteen-us-states-seek-block-obamas-clean-power-plan.

[125] After President Trump's withdrawal from the Paris Agreement, seventeen states formed the U.S. Climate Alliance, an effort designed to reduce carbon emissions. *See States United for Climate Action*, *supra* note 29. Virginia adopted major new climate legislation in 2020 that will accelerate the decarbonization of its electricity grid. *See* Sarah Rankin, *Virginia Lawmakers Send "Historic" Energy Bill to Governor*, AP (Mar. 6, 2020), https://apnews.com/c2c7dcd9132d496a9879cbccfd136a0d.

[126] *See* TVA 2018 10-K, *supra* note 83.

[127] *See State Renewable Portfolio Standards and Goals*, NAT'L CONFERENCE OF STATE LEGISLATORS (Feb. 1, 2019), http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx.

[128] *See* DAVID *VOGEL, TRADING UP: CONSUMER AND ENVIRONMENTAL REGULATION IN A GLOBAL ECONOMY (1995).*

These out-of-area requirements can lead to increased renewable or clean energy demand, especially by large customers with nationwide operations, and increased electrification of TVA-area vehicles, facilities, and suppliers. Thus, even if most of the states in the TVA service area do not follow suit, policies by California and other governments outside the TVA area may create incentives for TVA to decarbonize.

3. Local Government Action

Local governments, including local distribution utilities that purchase their power from TVA, are an increasingly likely source of motivation for TVA to accelerate its decarbonization efforts. The voting patterns of citizens in larger TVA-area cities suggest far more support for climate mitigation than the voting patterns at the state level.[129] As mentioned above, even if city policymakers are not motivated by public support for climate mitigation, they may favor decarbonization out of economic competitiveness concerns: they may be concerned that regions with electric grids that are out of sync with the 80 by 50 pathway will be at a disadvantage when competing with other regions for business recruitment and retention, tourism, and other economic development opportunities.[130]

Local governments could affect TVA's motivations to decarbonize in several ways.[131] For instance, local governments within the TVA service area could insist on purchasing renewable power for their own operations; adopt renewable power goals for all of the power users in their geographic areas; and adopt laws, policies, and programs to achieve these goals.[132] Policymakers could also pursue similar programs for energy efficiency and conservation or appoint board members for the local electric distribution utility who would pursue decarbonization initiatives. In addition, as we discussed above, even if governments within the TVA service area do not adopt decarbonization measures, actions by

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[129] *See 2016 District-by-District State Legislative Control*, *supra* note 22; *see* Jennifer Marlon, Peter Howe, Matto Mildenberger, Anthony Leiserowitz & Xinran Wang, *Yale Climate Opinion Maps 2018*, YALE PROGRAM ON CLIMATE CHANGE COMMC'N. (Aug. 7, 2018), https://climatecommunication.yale.edu/visualizations-data/ycom-us-2018/?est=happening&type=value&geo=county.

[130] *See* CDP, IT TAKES A CITY: THE CASE FOR COLLABORATIVE CLIMATE ACTION (2016), https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/001/172/original/CDP_Thematic-Report_2016.pdf.

[131] IRENA lists five key roles of cities in promoting renewable energy: vision setting and planning, direct purchase and control, norms and regulations, financing, advocacy and facilitation. IRENA REPORT, *supra* note 98.

[132] For general discussion of local government prerogatives to adopt their own clean energy initiatives, especially in the context of land use management, see Jim Rossi & Chris Serkin, *Energy Exactions*, 104 CORNELL L. REV. 643 (2019).

governments outside the service area could increase the economic and social pressure for decarbonization within it.

A brief review of national trends among cities and recent activity within the TVA service area suggests that local government pressure for decarbonization is growing. Many cities and local governments in the U.S. have made climate or renewables commitments.[133] For instance, over 167 U.S. mayors have signed onto the Global Covenant of Mayors for Climate and Energy, which commits cities to achieving the goals of the Paris Agreement.[134] In addition, 1,066 U.S. cities have signed onto the Mayor's Climate Protection Agreement, which commits them to meet or beat the Kyoto Protocol targets in their communities while also urging their state and federal government to do the same.[135] Further, 133 cities have committed to the Sierra Club's "Ready for 100" initiative, which encourages cities to move to 100% clean and renewable energy.[136] This initiative recognizes all commitments to 100% renewable energy and offers recommended target years and planning processes.[137] Over 100 U.S. cities have designated a future date to achieve 100% renewable energy.[138] In addition, in 2019 former New York Mayor Michael Bloomberg committed $500 million to lobby for local government and other officials to close the remaining 231 coal plants in the U.S.[139]

Only a few of the cities in the TVA service area participate in national climate initiatives. No cities in TVA's service area have joined the Sierra Club Ready for 100 commitment,[140] and no cities in TVA's service area have made the United States Conference of Mayors list for city-wide

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133 *See* Hari M. Osofsky & Janet Koven Levit, *The Scale of Networks: Local Climate Change Coalitions*, 8 CHI. J. INT'L L. 409 (2008); BLOOMBERG PHILANTHROPIES, FULFILLING AMERICA'S PLEDGE (2018), https://www.bbhub.io/dotorg/sites/28/2018/09/Fulfilling-Americas-Pledge-2018.pdf.

134 *Global Covenant of Mayors for Climate & Energy: United States*, GLOBAL COVENANT OF MAYORS FOR CLIMATE & ENERGY, https://www.globalcovenantofmayors.org/region/usa/ (last visited Oct. 14, 2019). Data is current as of April 2020.

135 *Mayors Climate Protection Agreement*, THE U.S. CONFERENCE OF MAYORS, https://www.usmayors.org/mayors-climate-protection-center/ (last visited Oct. 14, 2019). Data is current as of April 2020.

136 *100% Commitments in Cities, Counties, & States*, SIERRA CLUB, https://www.sierraclub.org/ready-for-100/commitments (last visited Oct. 14, 2019).

137 *Id.*

138 *Id.*

139 Lisa Friedman, *Michael Bloomberg Promises $500 Million to Help End Coal*, N.Y. TIMES (June 6, 2019), https://www.nytimes.com/2019/06/06/climate/bloomberg-climate-pledge-coal.html.

140 *See* SIERRA CLUB, *supra* note 136; *About TVA*, TENN. VALLEY AUTH., https://www.tva.gov/About-TVA (last visited Oct. 15, 2019). Nashville's renewables commitment may enable it to qualify. See discussion *infra* note 142.

renewable goals or cities in progress as of mid-2019.[141] Several recent actions by cities in the TVA service area, however, signal that cities in the area are becoming more focused on decarbonization. Nashville, Tennessee, is one of the two largest TVA-area cities, and its local distributor, Nashville Electric Service, is a major local distributor of TVA power. Several recent actions by the Nashville government will ramp up pressure on TVA over the next two decades. The last two mayors have made major climate commitments,[142] and the current Mayor, John Cooper, has joined the Global Covenant of Mayors.[143] Perhaps most important, the Nashville city council passed a bill establishing renewable energy procurement goals for the city, including a plan that requires the Nashville government to procure 100% renewable energy by 2041.[144]

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[141] The United States Conference of Mayors maintains a list of cities with city-wide renewable goals and cities in progress. *See Cities with city-wide renewable energy goals (including commercial and residential)*, THE U.S. CONFERENCE OF MAYORS, http://www.usmayors.org/wp-content/uploads/2018/01/Cities-with-city-wide-renewable-energy-goals.pdf (last visited Oct. 14, 2019).

[142] In June 2016, Nashville Mayor Megan Barry signed the Statement from the Climate Mayors in Response to President Trump's Withdrawal from the Paris Climate Agreement, and she joined the Global Covenant of Mayors for Climate and Energy, which commits the city to meeting the goals of the Paris Agreement by reducing greenhouse gas emissions and limiting further global temperature increases to 1.5 degrees Celsius. Climate Mayors, *407 US Climate Mayors commit to adopt, honor and uphold Paris Climate Agreement goals*, MEDIUM (June 1, 2017), *available at* https://medium.com/@ClimateMayors/climate-mayors-commit-to-adopt-honor-and-uphold-paris-climate-agreement-goals-ba566e260097. After Mayor Barry resigned in 2018, David Briley become the interim mayor and committed "to implementing science-informed CO2-reduction goals for the city as outlined by the Livable Nashville Committee's Climate and Energy Subcommittee." *Mayor Briley Marks Earth Day by Announcing Let's Move Nashville is Equivalent to Planting 1 Million Trees*, NASHVILLE.GOV (Apr. 21, 2018), https://www.nashville.gov/News-Media/News-Article/ID/7443/Mayor-Briley-Marks-Earth-Day-by-Announcing-Lets-Move-Nashville-is-Equivalent-to-Planting-1-Million-Trees.aspx. The goals commit the city to reducing GHG emissions from Nashville Metro government operations by 20% by 2020, 40% by 2030, and 80% by 2050, and citywide emissions by 10% by 2020, 30% by 2030, and 70% by 2050. *Id.* The goals also commit the city to installing 10MW of renewable energy by 2020 (energy from renewables increased to 30% by 2030). *Id.*

[143] Mayor Cooper signed the Global Covenant of Mayors, which is a precursor to participating in the C40 Cities Climate Leadership Group, and he committed to "work toward reducing Nashville's community-scale emissions 30 percent by 2030 and 70 percent by 2050. To lead by example, CO2-reduction targets for Metro Government will be 40 percent by 2030 and 80 percent by 2050. Using Nashville's most recent emissions inventories as a baseline, these targets were developed upon surveying those adopted by peer and aspirational cities and align with science-based recommendations in the Paris Climate Accord to reduce absolute CO2 emissions by three percent annually until 2050 in order to hold global warming to 2°C." Chris Song, *Mayor Cooper Announces Multiple Initiatives to Combat Climate Change and Promote Sustainability Signs Global Covenant of Mayors*, NASHVILLE.GOV (Dec. 12, 2019), https://www.nashville.gov/News-Media/News-Article/ID/9133/Mayor-Cooper-Announces-Multiple-Initiatives-to-Combat-Climate-Change-and-Promote-Sustainability-Signs-Global-Covenant-of-Mayors.aspx.

[144] On June 4, 2019, Nashville passed Bill BL2019-1600 to establish a standard for the Metropolitan Government of Nashville and Davidson County. Metropolitan Gov't of Nashville and Davidson Cty., Ordinance No. BL2019-1600 (2019) (as amended), *available at*

Unless the city is willing to meet its goals by procuring renewable energy credits, these goals will require more renewable power than the generation mix envisioned by TVA's base case. The Nashville council also adopted bills that require the electrification of the metro government motor vehicle fleet and efficiency standards for metro government buildings.[145]

Although Nashville was the first city in the TVA territory to commit to a renewable energy goal, other important movement has recently occurred among some of TVA's largest municipal utility customers. For instance, in 2019 Knoxville set comparable goals, and the recently-elected Knoxville mayor also has signaled support for climate mitigation and renewable power.[146] Memphis Light, Gas and Water, the largest of the local distribution utilities in the TVA service area, has signaled that it may defect from the grid, at least in part because of concerns about the inability to procure sufficient amounts of renewable power from TVA.[147] Other major cities in the TVA service area have large groups of progressive voters and a history of taking more pro-environmental steps than their respective state governments, and they may follow the lead of Nashville and the other cities.[148] In addition, if renewable energy becomes the cheapest option for meeting local energy needs, widespread voter climate mitigation support may not be needed to spark this change.

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https://www.nashville.gov/Metro-Clerk/Legislative/Ordinances/Details/d30e0174-6c6b-45d8-b93a-05b5d285c76e/2015-2019/BL2019-1600.aspx (last visited Oct. 15, 2019). Starting with 2020, "total carbon-free energy usage shall be not less than 53%, with not less than 20% from tier one renewable sources, not less than 2.5% from tier two renewable sources, and not less than 1% from solar energy." *Id.* In 2041 "the percentage of total carbon-free energy usage shall be not less than 100%, with not less than 100% from tier one renewable sources, not less than 0% from tier two renewable sources, and not less than 10% from solar energy." *Id.* These goals are sufficient to enable Nashville to become a member of the Sierra Club Ready for 100 initiative.

[145] Metropolitan Gov't of Nashville and Davidson Cty., ORDINANCE No. BL2019-1598 (2019) [hereinafter ORD. No. BL2019-1598].

[146] In 2019, Knoxville Mayor Madeline Rogero announced goals of GHG emissions reductions of 50% by 2030 and 80% by 2050. *See* Tyler Whetstone, *Knoxville City Leaders Announce Ambitious Climate Goals for 2030, 2050,* KNOXVILLE NEWS SENTINEL (June 5, 2019), https://www.knoxnews.com/story/news/politics/2019/06/05/knoxville-green-thumb-city-leaders-announce-ambitious-climate-goals-2030-2050/1274703001/. New Knoxville Mayor Indya Kincannon has supported climate mitigation and renewable power efforts. *See Knoxville Elects Kincannon as New Mayor*, TENNESSEE TRIBUNE (Nov. 7, 2019), https://tntribune.com/community/local/knoxville/knoxville-elects-kincannon-as-new-mayor/.

[147] David Flessner, *Memphis Light Gas & Water studies leaving TVA, eyes energy options*, TIMES FREE PRESS (Feb. 24, 2019), https://www.timesfreepress.com/news/business/aroundregion/story/2019/feb/24/memphstudies-leaving-tvamlgw-eyes-energy-opti/489158/.

[148] *See* James Bruggers, *Cities Pressure TVA to Boost Renewable Energy as Memphis Weighs Breaking Away*, INSIDECLIMATE NEWS (Apr. 30, 2019), https://insideclimatenews.org/news/30042019/tva-renewable-energy-memphis-nashville-knoxville-climate-change-coal-costs.

III. PRIVATE GOVERNANCE

Given the limited federal and state pressure on TVA, could other actors motivate TVA to accelerate its decarbonization glide path? Part III suggests that the answer is yes. In addition to pressure from local governments and from states outside the TVA area, private governance initiatives may be able to harness support from a combination of investors, major corporate and institutional customers, and households. Private governance initiatives draw on many of the same regulatory tools or instruments as government initiatives: prescription, property, market leveraging, tradeable permit regimes, information, procurement, and insurance.[149] For many sectors and regions, private actors, whether non-governmental organizations, philanthropists, corporations, or other private organizations, use these tools when seeking to achieve environmental and other social goals, but to date no organization has developed a major utility-focused private governance initiative in the Southeast. Part III examines how an initiative that utilizes these tools may motivate TVA to accelerate its decarbonization efforts.

A. The Private Drivers of Decarbonization

As we discussed above, TVA's 2018 10-K provides a roadmap to major concerns that may affect its decision making regarding decarbonization. In its 10-K, TVA acknowledged the importance of its ability to attract investors for its bonds,[150] and it repeated statements made in earlier annual reports indicating that reductions in electricity demand arising from efficiency and conservation pose a material risk.[151] TVA also disclosed a new type of material risk: distributed generation and consumer preferences for renewable energy.[152]

Dozens of private climate mitigation initiatives have emerged in the last decade, and they have used a mix of tools,[153] but information, prescriptive standards, procurement, and market leveraging are the most

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[149] *See* Light & Orts, *supra* note 6, at 13, tbl.1 (identifying as instruments used by public and private governance prescription, property, market leveraging, tradeable permit regimes, information, procurement, and insurance). *See also* Roy Boyd, Kerry Krutilla, & W. Kip Viscusi, *Energy Taxation as a Policy Instrument to Reduce CO2 Emissions: A Net Benefit Analysis*, 29 J. ENVTL. ECON. & MGMT. 1 (1995) (identifying instruments); JAMES SALZMAN & BARTON H. THOMPSON, ENVIRONMENTAL LAW AND POLICY 44-52 (5th ed. 2013); James Salzman, *Teaching Policy Instrument Choice in Environmental Law: The Five P's*, 23 DUKE ENVTL. L. POL'Y F. 363 (2013).

[150] TVA 2018 10-K, *supra* note 83, at 38.

[151] *Id.*

[152] *Id.*

[153] Light & Orts, *supra* note 6, at 2-5, 12-13.

important for TVA-related decarbonization efforts.[154] The discussion below explores how these tools could be used in a private initiative focused on TVA decarbonization.

B. Supply Side Pressure

1. Bondholders

Private initiatives that increase investor pressure may motivate TVA to accelerate its decarbonization and development of renewable power. According to its 2018 10-K, as of mid-2018 TVA had over $20 billion[155] in outstanding debt. When TVA's long-term debt matures, TVA typically refinances by issuing new debt.[156] TVA's portfolio has diverse maturity times and a long average life that in some cases extends beyond 2030, when the gap may begin to emerge between TVA's emissions trajectory and the 80 by 50 pathway.[157] As of September 30, 2018, the average life of TVA's debt portfolio was 16.3 years.[158] In 2017, the average life was 16.6 years.[159] In the next five years, roughly $6 billion of TVA's debt, or just under 30%, will mature, suggesting that TVA will either be paying down substantial amounts of debt or actively selling new debt instruments.

TVA Bondholders. The typical understanding of corporate debt is that bondholders trade governance rights for less investment risk. In response to changes in bond markets, however, including more frequent trading by bondholders, scholars have noted the importance of integrating bondholders into corporate decision making, especially when reducing

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154 VANDENBERGH & GILLIGAN, BEYOND POLITICS, *supra* note 4, at ch. 4 (discussing emergence of private environmental governance responses to climate change). The instrument less often used in the climate mitigation area is property, such as the creation of internal corporate property rights in water use, etc., to improve management. Land conservation efforts may fit into this category, however. *See* Vandenbergh, *supra* note 6. Insurance is another instrument that is growing in importance for private climate mitigation initiatives. Major insurance companies such as Allianz and Chubb have recently announced plans to stop insuring firms that rely on coal. *See* Allianz, *Statement on Coal-Based Business Models*, ALLIANZ.COM (updated Sept. 2018), https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/migration/media/press/document/Allianz-statement-on-coal-based-models_EN.pdf; *Chubb cuts coal insurance exposure because of climate change*, BBC (July 1, 2019), https://www.bbc.com/news/business-48808311. Although promising tools, property, market leveraging and insurance are beyond the scope of this Article.

155 TVA 2018 10-K, *supra* note 83, at 57.

156 *Id.* at 79.

157 *Id.*

158 *Id.*

159 *Id.*

systemic risks.[160] These insights are particularly important for an entity such as TVA that relies on bond financing. Even with more frequent trading, the generally long investment horizon of bondholders may motivate them to focus on ways to reduce future emissions-related liabilities and to avoid risks associated with an emissions gap that may begin in roughly a decade and continue over the following two decades.

Many of TVA's bonds are held by large institutional investors.[161] Some bondholders may be interested in TVA's emissions trajectory only if the trajectory affects TVA's financial condition, and TVA's 10-K identifies several tangible ways in which this may occur.[162] For instance, the 10-K discloses that TVA's material risks, such as emerging consumer preferences for renewable energy, may in turn reduce demand for power and may affect TVA's future debt and planning. Similarly, bondholders may be interested in the financial implications of the mismatch between TVA's emissions trajectory and the commitments of major city, corporate, and other institutional customers.

Some bondholders may also be interested in TVA's emissions trajectory if it is perceived to be inconsistent with the bondholders' environmental or social commitments and thus poses reputational risks to the bondholders. In recent years, large numbers of major institutional investors have signed onto one or more environmental, social, and governance ("ESG") platforms—a trend that is expected to continue to

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160 For discussion, see Steven L. Schwarcz, *Rethinking Corporate Governance for Bondholder Financed, Systemically Risky World*, 58 WM. & MARY L. REV. 1345 (2017).

161 Data available from Bloomberg makes it possible to identify the bondholders of corporations with publicly traded securities, including TVA. The analysis is based on TVA 2018 10-K and findings from Bloomberg Terminal. The Bloomberg Terminal data are publicly available, but the data must be purchased. Bloomberg Terminal maintains data related to TVA bonds and the research was conducted in June 2019. In the Terminal, the researcher conducted a search for TVA. The researcher then selected "major creditors" and then "aggregate debt." Finally, the researcher changed the debt inclusion to "current issuer" instead of "current issuer and all direct subsidiaries." From here, Bloomberg provided a list of all current TVA bondholders and their respective amounts held. Based on this initial analysis, thirty-three of TVA's 338 current bondholders have committed to at least one form of ESG (environmental, social governance) initiative indicating an interest in environmental impacts, totaling 9.76%. These institutional investors that have signed initiatives tend to be those with greater amounts held. Using Bloomberg's debt number, 12.5% of TVA's bondholder debt belongs to those with an ESG commitment. Using the 2018 10-K debt amount, 10.53% of TVA's debt belongs to those bondholders.

162 On June 26, 2019, Moody's confirmed TVA's AAA Stable rating, indicating that TVA is capable of meeting its current financial commitments. *Approximately $22.0 billion of debt securities affected*, MOODY'S INV. SERV. (June 26, 2019), https://www.moodys.com/research/Moodys-affirms-Tennessee-Valley-Authoritys-TVA-Aaa-senior-unsecured-ratings—PR_403576. TVA received "low dependence" because of its "protected monopoly position." It also received "high probability of government support" because of its importance to the Tennessee Valley since 1933. Moody's believes TVA can generate "significant free cash flows" to decrease its debt, but TVA's AAA rating could be affected by changes in regulations that remove TVA's protected position. *Id.*

grow.[163] These ESG platforms do not require the bondholders to commit to invest only in organizations with specific climate mitigation policies, much less deep decarbonization efforts. Several specifically target GHG emissions, though, and they all are an indication that these institutional investors are interested in a broad range of environmental attributes of their borrowers. As of mid-2019, our analysis suggests that roughly 10% (33/338) of all TVA bondholders, holding roughly 10% of TVA's debt,[164] participated in at least one ESG platform.[165] Although 10% of the value of TVA's bonds is already substantial, this percentage will grow if the recent trend toward increased institutional investor interest in ESG issues continues.

In its 2018 annual report, TVA acknowledged the risk posed by bondholder environmental concerns: "certain investors use the environmental impact or sustainability of an industry as a criterion for deciding whether to invest in that industry. TVA's use of fossil fuels or nuclear power could lead such investors to not purchase TVA Bonds."[166] These concerns may affect investors not only because of specific criteria used in screening investments, such as reliance on fossil fuels, but also may affect the organization's overall reputation, and TVA's annual report affirms the importance of its reputation to investors.[167] Table 2 lists several major investor ESG initiatives that TVA bondholders participate in and briefly describes the focus of each.

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[163] *See* Robert G. Eccles & Svetlana Klimenko, *The Investor Revolution*, HARV. BUS. REV., May-June 2019, at 106 (describing commitments to ESG by managers of large institutional investors).

[164] Roughly 10% to 12% of all TVA bondholder debt is held by these institutions.

[165] Roughly 28% of TVA's debt will mature in the next five years.

[166] TVA 2018 10-K, *supra* note 83, at 40.

[167] *Id.* at 41 ("As with any company, TVA's reputation is a vital element of its ability to effectively conduct its business. TVA's reputation could be harmed by a variety of factors, including the failure of a generating asset or supporting infrastructure, failure to effectively manage land and other natural resources entrusted to TVA, real or perceived violations of environmental regulations, real or perceived issues with TVA's safety culture or work environment, significant delays in construction projects, acts or omissions of TVA management, the perception of such acts or omissions, measures taken to offset reductions in demand, or a significant dispute with one of TVA's customers. Any deterioration in TVA's reputation may harm TVA's relationships with its customers and stakeholders, may increase TVA's cost of doing business, may interfere with its ability to attract and retain a skilled workforce, and may potentially lead to the enactment of new laws and regulations, or the modification of existing laws and regulations, that negatively affect the way TVA conducts its business.")

Table 2. Investor ESG Platforms

Organization	Commitment/ Organizational Goal
Ceres[168]	Ceres works with investors to manage negative environmental footprint and increase global investments in clean energy systems. Ceres provides working groups, webinars, events to members and is also the founding partner of the Climate Action 100+.
Climate Action 100+[169]	Climate Action 100+ is a five-year initiative made up of 320 investors with goals of implementing a strong governance framework, reducing GHG emissions across the value chain, and providing enhanced corporate disclosure. Climate Action 100+ engages with members to find solutions to the climate crisis.
ESG Research Australia[170]	Members commit to requesting that their Australian fund managers include ESG in their panel structures. ESG RA conducts stockbroker research focused on ESG issues.
Eumedion[171]	Eumedion hosts symposia for members, influences Dutch legislation, and encourages consultation between investors. Its goal is to increase sustainability in corporate governance across Europe.
Global Impact Investing Network ("GIIN")[172]	GIIN focuses on using activities, education, and research to help reduce the barriers to impact investing and improve the evidence base for the investing industry. Membership provides resources so that investors can allocate capital to find solutions to the world's challenges.

168 *Ceres Investor Network on Climate Risk and Sustainability*, CERES, https://www.ceres.org/networks/ceres-investor-network (last visited Oct. 14, 2019).

169 *Climate Action 100+*, CERES, https://www.ceres.org/initiatives/climate-action-100 (last visited Oct. 14, 2019).

170 *ESG Research Australia Membership*, RESPONSIBLE INVESTMENT ASSOCIATION AUSTRALASIA, https://responsibleinvestment.org/about-us/esgra/membership/ (last visited Oct. 14, 2019).

171 *Deelnemers*, EUMEDION, https://www.eumedion.nl/nl/deelnemers (last visited Oct. 14, 2019).

172 *Current Members*, GLOBAL IMPACT INVESTING NETWORK, https://thegiin.org/current-members (last visited Oct. 14, 2019).

Green Bond Principles ("GBP")[173]	GBP is a voluntary guideline process for issuing green bonds, and any organization that has issued, underwritten, or invested in a Green, Social, or Sustainability Bond can become a member. The guidelines focus on 1) use of proceeds, 2) evaluation/selection of bonds, 3) management of proceeds, and 4) transparent and accurate reporting.
Institutional Investors Group on Climate Change ("IIGCC")[174]	IIGCC's Investor Practices program hosts a forum for collaboration with the goal of implementing better practices for investors related to climate risks and opportunities. This program is developed from the Taskforce on Climate-Related Financial Disclosures ("TCFD").
Sustainability Accounting Standards Board ("SASB")[175]	SASB provides opportunities for members to learn about financial impacts of ESG issues and supports members in developing internal best practices.

Bondholder interest may affect TVA's decision-making in several ways. On an ongoing basis, TVA managers may respond if current investors monitor and communicate their preferences about ESG issues with their borrowers. This is a common practice among SRI investors; recently, this type of ongoing investor attention and communication with firms has begun to occur even among non-SRI investors. One example is a letter from the head of BlackRock, the largest institutional investor in the world, to corporate managers seeking information on plans for climate mitigation.[176] Similarly, ESG issues may influence TVA decision making about decarbonization by affecting the market for bonds, including TVA's debt.

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[173] *Membership*, INT'L CAPITAL MKT. ASS'N, https://www.icmagroup.org/green-social-and-sustainability-bonds/membership/ (last visited Oct. 14, 2019).

[174] *Our Members*, THE INSTITUTIONAL INVESTORS GROUP ON CLIMATE CHANGE, https://www.iigcc.org/about-us/our-members/ (last visited Oct. 13, 2019).

[175] *SASB Alliance Organizational Members*, SUSTAINABILITY ACCOUNTING STANDARDS BOARD, https://www.sasb.org/alliance-membership/organizational-members/ (last visited Oct. 13, 2019).

[176] Press Release, *Investors Underappreciate Climate-Related Risks in Their Portfolios—BlackRock Report*, BLACKROCK (Apr. 4, 2019), https://www.blackrock.com/corporate/newsroom/press-releases/article/corporate-one/press-releases/investors-underappreciate-climate-related-risks-in-their-portfolios; *see also BlackRock Environmental Sustainability*, BLACKROCK, https://www.blackrock.com/corporate/responsibility/environmental-sustainability (last visited March 4, 2020).

Private Initiatives. A 2019 NGO-organized initiative that focused on the global cement industry provides an example of how private investors might target their decarbonization initiatives at TVA or other utilities in the Southeast. The cement industry is one of the largest GHG-emitting sectors in the world, accounting for 7% of global emissions, and it has been the target of a number of naming-and-shaming campaigns by deep green environmental groups.[177] Recently, a bright green NGO, the Institutional Investors Group on Climate Change, worked with Ceres and other NGOs to induce ten investors with more than $2 trillion in assets under management to pressure the cement industry to more fully disclose climate risks and to commit to carbon neutrality by 2050.[178] This investor-centered initiative used several private governance tools, including market leveraging in the form of pressure from investors and information disclosure to motivate action. The initiative also included a call for companies to adopt carbon emissions commitments and to impose emissions requirements on suppliers. Although the cement industry is unlikely to adopt these recommendations in toto, this type of pressure from investors is difficult for companies to ignore.

2. Corporate Customers

Bondholders on their own cannot require TVA to decarbonize, but TVA is already responding to pressure from some of its current customers regarding carbon emissions. TVA offers existing customers several options for purchasing renewable power,[179] and it has acknowledged customers' interest in the carbon intensity or carbon footprint of the

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[177] Avery Ellfeldt, *Investors Call Out Concrete Firms on Carbon Footprint*, GREENWIRE (July 23, 2019), https://www.eenews.net/greenwire/2019/07/23/stories/1060778739?show_login=1&t=https%3A%2F%2Fwww.eenews.net%2Fgreenwire%2F2019%2F07%2F23%2Fstories%2F1060778739.

[178] *See* THE INSTITUTIONAL INVESTORS GROUP ON CLIMATE CHANGE, INVESTOR EXPECTATIONS OF COMPANIES IN THE CONSTRUCTION MATERIALS SECTOR (2019) [hereinafter INVESTOR EXPECTATIONS]; Brendan Coyne, *Decarbonise or Risk Divestment, Investors Warn Cement Makers*, THE ENERGYST (July 22, 2019), https://theenergyst.com/decarbonise-or-divestment-investors-warn-big-cement/.

[179] *Valley Renewable Energy for Business & Industry*, TENN. VALLEY AUTH., https://www.tva.gov/Energy/Valley-Renewable-Energy/Valley-Renewables-For-Business-Industry (last visited Oct. 13, 2019). TVA allows customers to pay for EnergyRight®. Monthly $4 investments guarantee 150 kilowatts of clean, renewable energy added to the grid. TVA also offers Green Power Providers (GPP) for small-scale (up to 50 kW) projects across the valley. GPP participants are paid for each kWh generated. For businesses, TVA offers Green Power Switch and the GPP program. TVA sells Renewable Energy Certificates to companies, allowing businesses to obtain the legal right of generated energy. TVA also offers investments in solar photovoltaic energy, between 50 kW and 2 MW. *Id.*

electricity they buy.[180] According to TVA, companies ask for such data because some product markets and investors are responding to their own customers' and other investors' demands for carbon footprint information.[181] In response, TVA has developed a "Carbon Competitiveness" policy, which assists its customers in accounting for the carbon associated with the electricity they use. TVA has developed a customer-specific carbon-footprint model to enable it to tailor its responses to specific customers instead of giving customers the average emissions from the TVA grid.

Customer pressure is particularly salient when it comes from corporate customers. These corporations can account for carbon in facility siting decisions and are affected by their reputation on a national or international scale. Nearly two-thirds of TVA's generated electricity supplies commercial and industrial buyers in the Tennessee Valley, either through local utility partners or through TVA's direct-service contracts with large industrial customers.[182] Because energy supply is often a primary concern for corporate buyers, especially those considering additional investments in the Tennessee Valley, one of TVA's most important functions is to support economic development in the area by responding to corporate energy demand. In recent years, corporate buyers have increasingly demanded renewable energy, placing TVA's current decarbonization pathway and renewables portfolio increasingly at odds with the public commitments of many of its corporate customers. This decarbonization and renewables deficit may reduce the region's ability to retain existing corporate customers and attract new ones.

Existing TVA Corporate Customers. Many large corporations have set targets for renewable energy use or GHG emission reductions. For instance, nearly half (48%) of the Fortune 500 had a climate or energy target in 2016, up 5% from 2014. Although most of these targets address GHG emissions generally, rather than clean or renewable power, companies often rely on procurement of renewable energy to meet both types of goals. A review of the 2018 Fortune Global 500 suggests that 21 of 126 U.S. companies (17%) and 30 of 374 foreign companies (8%) have also committed to 100% renewable energy (defined as biomass,

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[180] More on the model can be found on TVA's website. *Carbon Competitiveness*, TENN. VALLEY AUTH., https://www.tva.com/newsroom/articles/carbon-competitiveness (last visited April 24, 2020).

[181] *Id.*

[182] *See* U.S. Energy Information Administration, *Annual Electric Power Industry Report, Form EIA-861 detailed data files* (Oct. 1, 2019), https://www.eia.gov/electricity/data/eia861/ [hereinafter USEIA Form 861 TVA Sales Data].

geothermal, solar, water, or wind sources, but not nuclear or hydroelectric).[183]

The motivations for these corporate targets are varied, but they often include tangible business benefits such as reduced operating costs and long-term price stability. In 2016, 190 members of the Fortune 500 collectively reported $3.7 billion in annual savings from projects associated with their renewable energy and greenhouse gas emissions targets.[184] Companies are also acting in response to significant reputational risk. Alphabet, the parent of Google, has indicated that "not addressing climate change risks and impacts head on could result in a reduced demand for our goods and services because of negative reputation impact."[185]

Many types of companies set environmental goals. Although large corporations like Facebook, Google, and Walmart earn the most press for their environmental commitments, somewhat smaller companies are setting goals as well. In 2016, 44% of the bottom quintile of the Fortune 500 had a commitment, compared to 63% of the 100 largest companies in the country.[186] Commitments are also spread across many industries. Of the eleven sectors represented in the Fortune 500, more than half of the companies in six of the sectors have made environmental commitments. Energy is the only sector that falls significantly behind the others, with only 11% of companies making commitments.[187]

Our analysis suggests that Fortune 500 companies headquartered in the Tennessee Valley lagged only slightly behind the national average in environmental target-setting in 2016, with 40% of such companies setting some sort of emissions or renewables goal.[188] In addition, TVA formally targets a selection of industries for economic development, which include four of the six sectors most likely to make environmental commitments (consumer staples, materials, industrials, and information technology) and only one of the five trailing sectors (consumer discretionary).[189]

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183 *RE 100 Overview*, RE100, http://there100.org/re100 (last visited Oct. 15, 2019).

184 CDP, CALVERT RES. AND MGMT., CERES, & WWF, POWER FORWARD 3.0: HOW THE LARGEST U.S. COMPANIES ARE CAPTURING BUSINESS VALUE WHILE ADDRESSING CLIMATE CHANGE (2017), http://assets.worldwildlife.org/publications/1049/files/original/Power_Forward_3.0_-_April_2017_-_Digital_Second_Final.pdf.

185 CDP, MAJOR RISK OR ROSY OPPORTUNITY, ARE COMPANIES READY FOR CLIMATE CHANGE? (2019), https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/588/original/CDP_Climate_Change_report_2019.pdf.

186 CDP, *supra* note 184.

187 *Id.*

188 *Id.*

189 *Id.*

Historically strong Tennessee Valley industries like advanced manufacturing, consumer products, and industrial products are among the leading sectors on environmental commitments. Automobile and automobile component manufacturing, some of the largest industries in the TVA service area, fall in a trailing sector, but several of the automotive firms that have located in the Tennessee Valley are among those that have set environmental goals, including Volkswagen, Nissan, and General Motors.[190]

Commitments are only a first step toward emissions reductions, but many corporations have achieved or are actively seeking to achieve their commitments, often with oversight by environmental NGOs.[191] Of the large companies targeting 100% renewable energy, the average target year is only seven years away.[192] To meet impending commitments, corporations have significantly ramped up their purchases of renewable electricity. Fortune 500 companies have more than doubled their overall green power procurement since 2014 (a subset of renewable energy not including conventional sources like nuclear or hydropower), and twenty-two members of the Fortune 500 are already procuring at least 100% of their total electricity usage from green power.[193] Momentum appears to be building even as the federal government has scaled back climate mitigation efforts; new deals for corporate renewable energy increased steeply in 2018, more than doubling the newly contracted capacity in the previous year, which also set a record.[194]

As of April 2019, the Fortune 500 procures about 7% of its total electricity usage from green power sources.[195] If TVA's commercial and

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[190] CDP, *supra* note 184; Joshua Kennon, *What Are the Sectors and Industries of the S&P 500?*, THE BALANCE (June 25, 2019), https://www.thebalance.com/what-are-the-sectors-and-industries-of-the-sandp-500-3957507; Volkswagen, *Climate Change – What Volkswagen is Doing*, https://www.volkswagenag.com/en/news/stories/2018/12/volkswagen-accepts-climate-responsibility.html# (last visited Apr. 8, 2020); Nissan Motor Corp., *Climate Change: Strategy for addressing climate change*, https://www.nissan-global.com/EN/SUSTAINABILITY/REPORT/ENVIRONMENTAL/CLIMATE/STRATEGY/ (last visited Apr. 8, 2020); General Motors Co., *Climate Change 2018* (2018), https://www.gmsustainability.com/_pdf/cdp/Climate_Change_2018_Information_Request-General_Motors_Company.pdf.

[191] GREENPEACE, CLICKING CLEAN VIRGINIA (Feb. 13, 2019), https://www.greenpeace.org/usa/wp-content/uploads/2019/02/Greenpeace-Click-Clean-Virginia-2019.pdf.

[192] *REE 100 Overview*, *supra* note 183.

[193] *Green Power Partnership Fortune 500 Partners List PDFs*, EPA, https://www.epa.gov/greenpower/green-power-partnership-fortune-500r-partners-list-pdfs (last visited Oct. 15, 2019).

[194] *BRC Deal Tracker*, RENEWABLE ENERGY BUYERS ALLIANCE, https://businessrenewables.org/corporate-transactions/ (last visited Oct. 15, 2019).

[195] This assumes that the average Fortune 500 company uses as much electricity as the average EPA Green Power Partner in the Fortune 500.

industrial buyers demanded an equal portion of their energy from renewable sources, that energy would represent just over 4% of TVA's total energy demand and would be worth more than $440 million in annual revenue to TVA's local distributors.[196] Based on existing targets and commitments, current renewable energy demand in the global commercial and industrial sectors is equal to 19% of these sectors' total electricity demand, which, under the same analysis, would represent 12% of TVA's sales and $1.3 billion in revenue. This share is expected to expand over the next decade.[197] Today, only 3% of TVA's current generation capacity is in comparable renewables (solar and wind), and these resources are allocated to residential customers as well.[198]

New TVA Corporate Customers. The availability of renewable or low-carbon power plays an important role in new business recruitment, and TVA has agreed to provide renewable power in its negotiations with potential new businesses in the Tennessee Valley. Facebook has committed to 100% renewable energy by the end of 2020 and enters into contracts for large renewable energy projects for each of its new data centers. Facebook insists on siting wind and solar projects on the same grid as each new facility, making jobs and investment from new Facebook facilities in the Tennessee Valley contingent upon TVA's ability to deliver new renewable energy.[199] In 2018, TVA and Facebook announced such a partnership, bringing major solar installations to Tennessee and Alabama to serve Facebook's $750 million data center in Huntsville, Alabama.[200]

Google, the largest corporate renewable energy buyer in the world, also expects to provide 100% regionally-sourced renewable energy for its

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[196] USEIA Form 861 TVA Sales Data, *supra* note 182; *Green Power Partnership*, *supra* note 193.

[197] USEIA Form 861 TVA Sales Data, *supra* note 182; IRENA, *Corporate Sourcing of Renewables: Market and Industry Trends – Remade Index 2018*, 57 fig. 3.2 (2018), https://irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_Corporate_sourcing_2018.pdf.

[198] *Our Power System*, TENN. VALLEY AUTH., https://www.tva.gov/Energy/Our-Power-System (last visited Oct. 15, 2019).

[199] *On Our Way to Lower Emissions and 100% Renewable Energy*, FACEBOOK NEWSROOM (Aug. 28, 2018), https://newsroom.fb.com/news/2018/08/renewable-energy/.

[200] *TVA Announces Largest Valley Solar Installations — Built for Facebook*, TENN. VALLEY AUTH. (Nov. 2, 2018), https://www.tva.gov/Newsroom/Press-Releases/TVA-Announces-Largest-Valley-Solar-InstallationsBuilt-for-Facebook (statement of John Bradley, TVA's Senior Vice President of Economic Development) ("TVA's ability to deliver large amounts of renewable, reliable energy at competitive rates makes the Valley an attractive place to do business and recruit quality jobs."); Jim Gaines, *TVA Announces Solar Farms to Serve Google Data Centers*, KNOXVILLE NEWS SENTINEL (Jan. 16, 2019), https://www.knoxnews.com/story/money/business/2019/01/16/tva-solar-farms-google-data-centers/2595383002/.

data centers, and it similarly requires direct renewable energy purchases in the markets where its operations are located.[201] In 2019, Google and TVA announced 413 MW of new solar capacity (more than a third as much power as provided by each of TVA's Watts Bar nuclear reactors) to serve data centers in Tennessee and Alabama.[202] In sum, these renewable energy projects facilitated data center investments by Facebook and Google totaling $1.95 billion.[203]

Despite the significant economic opportunity available from providing corporate buyers with affordable and reliable renewable energy, the Tennessee Valley has a mixed record on offering attractive options for businesses pursuing renewable energy procurement. In 2017, the trade associations Retail Industry Leaders Association ("RILA") and Information Technology Industry Council ("ITI") published a state leadership index to guide member companies in their renewable energy purchases. The report notes that "the structure of a state's electricity market can directly influence where corporations choose to invest in renewable projects, and in which states they decide to expand their operational footprint." Tennessee was ranked forty-fourth out of fifty states in the composite ranking, and tied for last (with zero points) in "Utility Purchasing Options," which includes analysis of utility-level structures and policies, including green tariffs, green power purchase options, commercial and industrial retail choice, and the presence of an independent system operator or regional transmission organization. The report notes that Tennessee was one of only four states (along with Georgia, Oklahoma, and Alabama) to receive a score of zero for both interconnection and net metering policies to support distributed generation systems.[204]

Utilities play an important role in new corporate site selection due to the complexity of service boundaries and diversity of utility policies. Many electric utilities have economic development arms that offer lower rates to attract moves or offer financial incentives to firms that adopt

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201 CDP, *supra* note 184.

202 Gaines, *supra* note 200.

203 Jerry Underwood, *Utility-scale solar projects brighten Alabama's tech recruitment efforts*, ALABAMA NEWS CENTER (Mar. 8, 2019), https://www.alabamanewscenter.com/2019/03/08/utility-scale-solar-projects-brighten-alabamas-tech-recruitment-efforts/; *Enriching the Montgomery County business community*, GOOGLE DATA CENTERS, https://www.google.com/about/datacenters/inside/locations/montgomery-county/ (last visited Oct. 15, 2019).

204 RETAIL INDUS. LEADERS ASSOC., INFO. TECH. INDUS. COUNCIL, & CLEAN EDGE, CORPORATE CLEAN ENERGY PROCUREMENT INDEX (Jan. 2017), https://www.itic.org/dotAsset/f9040bd1-7681-455a-9a64-5a518c16551d.pdf.

demand management programs.[205] As the Facebook and Google examples demonstrate, renewable energy availability is often an important factor.[206]

Private Initiatives. Although TVA has recorded high-profile successes by making renewable energy available to Google and Facebook, the broader policy and planning stance adopted by the region may adversely affect the Tennessee Valley's ability to compete for existing and new business. Edison Energy reports that 72% of large American companies are actively pursuing additional renewable energy purchases,[207] and a trend toward aggregation of energy demand is expected to open the renewable energy market to smaller companies. In 2018, first-time buyers made up 31% of renewable energy deals. These deals were driven by models in which firms aggregate their electricity use to sign a joint power purchase agreement, which allows more companies to take advantage of economies of scale in solar and wind energy production.[208] As these trends continue, corporate demand for renewable energy may become an increasingly powerful driver for TVA decarbonization.

The growing number of corporate customers committed to GHG emissions or renewables goals provides an opportunity to induce TVA to accelerate its decarbonization efforts. Firms that have made these commitments will face challenges if TVA's carbon intensity or renewables portfolio is inadequate. Corporate goals will be missed, supply chain requirements will not be met, and goods and services with a larger carbon footprint will be at a competitive disadvantage in areas where customers value climate mitigation.

Assessing the carbon deficit that may emerge over the long term between the decarbonization pathway of the TVA grid and the pathway of many other utilities is difficult, and firms may be unaware of the potential deficit. As with bondholder pressure, corporate customer pressure for decarbonization may be induced through a mixture of dark green and bright green initiatives that motivate and organize the interests of the corporate sector in the TVA service area. In addition, market

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[205] Dan Levine, *A Site Selector's Checklist for Locating in the U.S.*, AREA DEV. MAG. (2019), https://www.areadevelopment.com/LocationUSA/2019-US-inward-investment-guide/site-selectors-checklist-for-locating-in-US.shtml.

[206] For instance, Google and Facebook have insisted on renewable power for new facilities in the TVA service area. *See* Underwood, *supra* note 203.

[207] GREENTECH MEDIA INC., SHIFTING THE CORPORATE PERSPECTIVE ON ENERGY: A SERVICE, NOT A COMMODITY (2016), https://www.ourenergypolicy.org/wp-content/uploads/2017/01/CS-Edison-Energy-White-Paper.pdf.

[208] *See Green Power Providers*, TENN. VALLEY AUTH., https://www.tva.gov/Energy/Valley-Renewable-Energy/Green-Power-Providers (last visited Oct. 14, 2019).

leveraging in the form of pressure on TVA's large corporate customers by debt and equity investors may be influential.

Information disclosure that informs companies of the potential carbon deficit and holds them to their commitments may be important. Prescriptive requirements in the form of corporate clean energy and renewables policies by firms ranging from Facebook to Volkswagen are already having an effect, as are solar rooftop initiatives by Walmart and Target, two of the largest users of solar power in the U. S. Efforts to induce additional companies to make emissions commitments may increase the momentum for decarbonization, as may procurement requirements that transfer large firm emissions reduction requirements to smaller suppliers in the TVA service area. Although TVA may be able to resist some large corporate customer demands, demands arising from a large number of existing businesses and from new business relocations are difficult to dismiss, and if the costs of electricity storage decrease, large corporate customers may be able to defect from the grid if their needs are not met.

3. Other Large Institutional Customers

A wide array of non-corporate and non-governmental institutions, including colleges and universities, hospitals, museums, religious organizations, and civic and cultural organizations, also buy large amounts of TVA-generated power.[209] Recent announcements suggest that many of these organizations are interested in investing in or purchasing renewable energy. These organizations may have a range of motivations, including cost savings, reputation, a desire to align with sustainability norms, or religious commitments. Although these organizations' environmental and renewable energy goals are less heavily publicized than the goals emerging from major corporations, purchasing decisions by these organizations could increase renewable energy demand and place TVA's expected generation mix increasingly at odds with its customers' expectations.

At a national level, many American nonprofit organizations are already procuring renewable power. Of the 1,518 organizations reporting their green power usage to the Environmental Protection Agency's voluntary Green Power Partnership ("GPP") program, 16–20% are nonprofits, including school districts, higher education institutions, hospitals, clinics, religious organizations, museums, parks, zoos, and civic organizations.

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[209] These buyers typically buy their TVA-generated power through local distributors. *See* TENN. VALLEY AUTH., *Public Power for the Valley*, https://www.tva.com/energy/public-power-partnerships (last visited May 13, 2020).

These organizations are spread across 35 states, including Tennessee, Kentucky, North Carolina, and Virginia, and seven of the 200-plus non-profit participants are in TVA territory.[210]

Among nonprofits, colleges and universities have led the move toward renewable power. Motivated by cost savings, encouraged by student and faculty advocacy, and facilitated by long planning and investment horizons, more than 372 colleges and universities across the country have committed to achieving carbon neutrality by 2050.[211] To meet these goals, universities are making large-scale renewable energy purchases; the 166 universities represented in the GPP purchase an average of 62% of their total electricity from green sources, with 45 already procuring 100% or more.[212] Out of this group, the 30 largest-volume university buyers alone account for more than 3 billion kWh of green power use each year, enough to power 290,000 typical American homes.[213]

Universities in the Tennessee Valley are underrepresented among leaders in renewable energy procurement, but a handful of the largest have made major strides in recent years. Several TVA-area universities participate in the GPP (e.g., University of Tennessee, Knoxville; Sewanee: The University of the South; and Middle Tennessee State University).[214] The University of Tennessee, Knoxville, which purchases enough solar and wind power to match 67% of its electricity consumption, is the nation's sixth largest university for green power procurement[215] and has committed to carbon neutrality by 2061.[216] Mississippi State University has committed to carbon neutrality by 2042, and indicates in its Climate Action Plan that "our energy generation goals rely heavily on TVA's 2020, 2030, 2040 Climate Change Goals. A fuel mix with an increasing portfolio of renewable energy sources is vital for us."[217] The most ambitious goal in TVA territory belongs to Sewanee:

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[210] *Green Power Partnership: All Partners*, EPA, https://www.epa.gov/greenpower/green-power-partner-list (last updated March 18, 2020).

[211] SECOND NATURE, 2017-2018 SECOND NATURE IMPACT REPORT (2018), https://secondnature.org/wp-content/uploads/2017-18_SecondNature_ImpactReport-1.pdf.

[212] *Green Power Partnership 100% Green Power Users*, EPA (Jan. 27, 2020), https://www.epa.gov/greenpower/green-power-partnership-100-green-power-users-1.

[213] *Frequently Asked Questions*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.php?id=97&t=3 (last updated Oct. 2, 2019); *Green Power Partnership Top 30 College and University*, EPA (July 20, 2019), https://www.epa.gov/sites/production/files/2019-10/documents/top30candu_july2019.pdf; *Green Power Partnership: All Partners*, *supra* note 210.

[214] *Green Power Partnership: All Partners*, *supra* note 210.

[215] *Green Power Partnership Top 30 College and University*, *supra* note 213.

[216] *Green Office*, UNIVERSITY OF TENN. KNOXVILLE, https://environment.utk.edu/programs/green-office/ (last visited Oct. 14, 2019).

[217] *See* MISS. ST. U., CLIMATE ACTION PLAN (2012), https://www.opdca.msstate.edu/files/cap_plan.pdf; *MTSU Sustainable Campus Fee Program*,

The University of the South, which has committed to carbon neutrality by 2030.[218]

In the last several years, the University of Tennessee, Chattanooga and Vanderbilt University have committed to carbon neutrality by 2050, with Vanderbilt also committing to 100% renewable energy for its campus operations.[219] In addition, in early 2020, Vanderbilt announced that it had reached an agreement with TVA, Nashville Electric Service, and Silicon Ranch Corporation to build a new solar facility in the TVA service area. The facility will offset roughly 70% of Vanderbilt's annual indirect GHG emissions from purchased electricity.[220]

Hospitals are large users of electric power, and some, particularly in large healthcare conglomerates, are also signaling increasing interest in renewable energy purchases.[221] Kaiser Permanente, for example, the largest integrated health system in the U.S., has committed to carbon neutrality by 2020 and carbon positivity by 2025. Across its campuses (including locations in Virginia and Georgia), Kaiser Permanente will produce and procure enough wind and solar energy to entirely offset its electricity demand by its 2020 target.[222] It is unclear whether hospitals in the TVA area will begin to follow the lead of these large integrated systems.

Some religious organizations also have supported climate mitigation and have committed to purchasing renewable energy. The Presbyterian Church, which claims 1.4 million active members in the U.S., passed a resolution in 2006 encouraging members and member churches to go carbon neutral, emphasizing "the Christian mandate to care for creation."[223] The Christian Church (Disciples of Christ) went a step further, passing a declaration in 2017 targeting carbon neutrality for

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MIDDLE TENN. ST. UNIV., https://www.mtsu.edu/cee/sustainable.php (last visited Oct. 14, 2019) (showing that other campuses have made less ambitious moves, such as Middle Tennessee State, which allows student groups to purchase renewable power credits).

[218] Luke Williamson, *When Will Sewanee Be Carbon Neutral?*, THE SEWANEE PURPLE (Mar. 14, 2018), https://thesewaneepurple.org/2018/03/14/when-will-sewanee-be-carbon-neutral/.

[219] *Climate Action Plan*, U. OF TENN. AT CHATTANOOGA (2011), https://www.utc.edu/sustainability/pdfs/cap-final.pdf; *FutureVU: Sustainability*, VAND. UNIV., https://www.vanderbilt.edu/sustainability/ (last visited Oct. 14, 2019).

[220] Katherine Keith, *Vanderbilt Commits to First-of-its-kind Renewable Energy Partnership with TVA, NES*, PRESS RELEASE, VANDERBILT UNIVERSITY (Jan. 22, 2020, 1:00 PM), https://news.vanderbilt.edu/2020/01/22/vanderbilt-commits-to-first-of-its-kind-renewable-energy-partnership-with-tva-nes/.

[221] BAY AREA COUNCIL ECON. INST., BUILDING A CLIMATE-SMART HEALTHCARE SYSTEM FOR CALIFORNIA (Mar. 2018), http://www.bayareaeconomy.org/files/pdf/BuildingAClimate-SmartHealthcareSystemForCalifornia-Interactive.pdf .

[222] *Id.*

[223] PAM MCVETY, GUIDE TO GOING CARBON NEUTRAL (2006), https://www.presbyterianmission.org/wp-content/uploads/carbon-neutral-guide.pdf.

congregations and ministries by 2030 and climate positivity by 2035, specifically indicating an expectation to substitute "clean, renewable energy for polluting fossil fuels."[224] The United Church of Christ also encourages congregations to move towards carbon neutrality, and it publishes a set of resources for churches to achieve this goal by sourcing renewable energy and pursuing other strategies.[225] Because TVA states are among the most religious in the country,[226] demand from religious institutions like these could play an important role in shifting TVA's demand toward renewable sources.

These developments by nonprofit organizations have occurred without coordination across sectors. An initiative to coordinate and harness the interests of these organizations would likely use many of the same information, market-leveraging, prescriptive standards, and procurement tools as would be used in a corporate initiative. The large number of organizations and large amount of electricity these organizations use suggest that an initiative of this type could meaningfully increase the demand for low-carbon or renewable energy in the TVA service area.

4. Households

Another potential source of pressure on TVA to decarbonize is household uptake of solar systems or other household- or community-level renewable power, an issue that TVA noted is a material threat in its 2018 10-K.[227] Household rooftop solar is more expensive than industrial-scale solar, but interest around the U.S. has grown, and as of 2017 roughly 10.345 GW of household rooftop solar is now in place.[228] In fact, the demand for rooftop solar is sufficiently large to trigger a widespread movement by utilities to push state public utilities commissions ("PUCs")

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[224] CHRISTIAN CHURCH (DISCIPLES OF CHRIST), GA-1724 RESOLUTION CONCERNING CARBON NEUTRALITY (2017), http://disciples.org/wp-content/uploads/2018/07/2018Yearbook2017ResolutionsPP345-456.pdf.

[225] *Carbon Neutral Web Resources for Congregations*, UNITED CHURCH OF CHRIST, https://www.ucc.org/carbon_neutral_web_resources_for_congregations (last visited Oct. 14, 2019).

[226] Michael Lipka & Benjamin Wormald, *How religious is your state?*, PEW RESEARCH CTR. (Feb. 29, 2016), https://www.pewresearch.org/fact-tank/2016/02/29/how-religious-is-your-state/?state=alabama.

[227] TVA 2018 10-K, *supra* note 83.

[228] T. Wang, *U.S. residential sector annual solar PV capacity installations 2018*, STATISTA (July 31, 2019), https://www.statista.com/statistics/185694/us-residential-annual-pv-installed-capacity-since-2005/.

to adopt line charges and other financial disincentives for household adoption of solar photovoltaic ("PV") systems.[229]

Uptake of rooftop solar systems in the TVA service area has lagged behind many other regions, however, and TVA and its local distributors have only made limited solar PV options available to households.[230] For instance, one of the most popular programs that TVA and the Nashville Electric Service offered to subsidize household installation of solar PV systems was cancelled at the end of 2019.[231] If storage technologies improve and decline in cost, however, TVA and its local distributors face a risk that households will defect from the grid. Private initiatives along the lines of those discussed above may induce more rapid household grid defection in the absence of more rapid TVA grid decarbonization.

C. Demand

Private initiatives need not simply rely on applying pressure on TVA to increase the supply of low-carbon or renewable power. Instead, a mix of negative and positive inducements is available. TVA and other utilities have expressed concerns about reduced demand for their product arising from efficiency and conservation by households and large customers. Private initiatives could include "carrots" in the form of initiatives that increase electricity demand along with the "sticks" of demands for low-carbon or renewable power.

1. Efficiency and Conservation

For the first time since the end of World War II, U.S. per capita household electricity demand leveled off in 2010 and has declined over the last several years.[232] To the extent this decline in demand is occurring in the TVA service area as well, it is easy to understand why TVA identified household efficiency and conservation as a material threat in its 2018 10-K. Households represent a large share of TVA's demand, so they account for a large share of TVA's GHG emissions as well.

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[229] *See* Jacques Leslie, *Utilities Grapple with Rooftop Solar and the New Energy Landscape*, YALE ENV'T 360 (Aug. 31, 2017), https://e360.yale.edu/features/utilities-grapple-with-rooftop-solar-and-the-new-energy-landscape; Ptacek & Carter, *supra* note 52.

[230] Sophie Quinton, *Why There Aren't Many Rooftop Solar Panels in the South*, THE PEW CHARITABLE TRUSTS (Feb. 10, 2016), https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2016/02/10/why-there-arent-many-rooftop-solar-panels-in-the-south.

[231] *Green Power Providers*, *supra* note 208.

[232] Davis, *supra* note 23.

The TVA service area is among the worst in the U.S. in terms of household electric efficiency.[233] This creates an opportunity for a private initiative to target household electricity use. TVA and its local distributors have incentives to shift demand to times when electricity can be produced at low cost, but they cannot be expected to exacerbate a material threat to their finances, so it is unlikely that they will engage in a large, effective household efficiency effort.[234] A large-scale, sophisticated private initiative that targets the most promising opportunities could accelerate TVA's decarbonization by reducing electricity demand.[235]

Even without a reduction in electricity demand, the TVA area's carbon footprint could substantially decline if TVA combines decarbonizing electricity generation with electrifying appliances, heating and cooling systems, and other household uses of energy. Although electric heating is not as efficient as gas, if the electricity is generated from renewable sources, it has a smaller carbon footprint.[236] Other building electrification could occur via water heaters, stoves, and other appliances, along with lawn mowers, leaf blowers, and other yard equipment.[237] Electrification of water heaters alone could substantially increase electricity demand while reducing carbon emissions, so the advantages to TVA are considerable.[238]

2. Electrification of the Motor Vehicle Fleet

Electrification of the motor vehicle fleet is another potential carrot for TVA, and it could reduce the carbon footprint of the TVA service area substantially if it is combined with decarbonization of the electric grid. Electric vehicles currently make up 2% of the global market, but their

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[233] *See* S. ALLIANCE FOR CLEAN ENERGY, ENERGY EFFICIENCY IN THE SOUTHEAST: 2018 ANNUAL REPORT (2018), https://cleanenergy.org/wp-content/uploads/2018-Energy-Efficiency-in-the-Southeast-SACE-2.pdf.

[234] Michael P. Vandenbergh & Jim Rossi, *Good for You, Bad for Us: The Financial Disincentive for Net Demand Reduction*, 65 VAND. L. REV. 1527 (2012).

[235] For a discussion of household carbon emissions opportunities, see Dietz, et al., *supra* note 24.

[236] *Learn about Energy and its Impact on the Environment*, EPA, https://www.epa.gov/energy/learn-about-energy-and-its-impact-environment#impact (last updated Aug. 12, 2019).

[237] Trieu Mai, et al., *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States*, NAT'L RENEWABLE ENERGY LAB. (2018), https://www.nrel.gov/docs/fy18osti/71500.pdf.

[238] *Cf.* Asa Hopkins, et al., *Decarbonization of Heating Energy Use in California Buildings*, 8SYNAPSE ENERGY ECON., INC., 6 (Oct. 2018), https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf (describing replacement effect of water heater electrification based on California energy grid).

price is anticipated to drop below the cost of petroleum-fueled vehicles by the mid-2020s, and momentum is growing for electrification of the motor vehicle fleet in the U.S. and around the world.[239] As Table 3 indicates, many countries plan to have electric vehicles make up 50% or more of all vehicles sold by 2030 to 2040, and others have adopted a target of 30% by 2030.

Table 3 Electric Vehicle Targets[240]

Countries with EV Sales Targets or ICE Bans of 50% or More

Country	Target	Target Date
Canada	100%	2040
China	40-50%	2040
Costa Rica	100%	2050
Denmark	100%	2030
France	100%	2040
Iceland	100%	2030
Ireland	100%	2030
Israel	100%	2030
Netherlands	100%	2030
Norway	100%	2025
Portugal	100%	2040
Slovenia	100%	2030
Spain	100%	2040
United Kingdom	100%	2040

Note: Countries committed to EV30@30 (30% EV sales by 2030) are Canada, China, Finland, France, India, Japan, Mexico, Netherlands, Norway, Sweden, and United Kingdom.

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[239] Emily Lindsay Brown, *Cars of the future that will help fight climate change – Imagine newsletter #3*, THE CONVERSATION (June 13, 2019, 11:11 AM), https://theconversation.com/cars-of-the-future-that-will-help-fight-climate-change-imagine-newsletter-3-118289.

[240] *Global EV Outlook 2019: Scaling up the transition to electric mobility*, INT'L ENERGY AGENCY (May 2019), www.iea.org/publications/reports/globalevoutlook2019/; *E-Mobility Trends and Targets: as of July 1, 2019 (constantly updated)*, PARTNERSHIP ON SUSTAINABLE LOW CARBON TRANSPORT (2019), https://slocat.net/wp-content/uploads/2020/02/SLOCAT_2020_e-mobility-overview.pdf.

In addition, many local governments in the U.S. and around the world have adopted targets for electrification of municipal government fleets.[241] This movement has begun to make headway in the TVA service area as well. For instance, the Nashville city council adopted a bill that will require the municipal government to fully electrify its fleet, with exceptions for some emergency vehicles, in increments over the next decade.[242]

The growth of the electric vehicle market also has accelerated the development of battery technologies that might alleviate range anxiety and the intermittent supply issues linked to various renewable generation options.[243] Implementation of battery technologies with two-way communication also could enable more efficient use of other distributed electricity resources on the grid.[244] This can create a system that benefits consumers by reducing consumption, providing detailed energy use data, and increasing comfort.[245]

TVA has noted in its 10-K that it and its local distributors will likely be affected by the changes in energy use patterns resulting from this integration,[246] and TVA is working on a vehicle electrification program.[247] Not surprisingly, TVA's initiative on this topic includes a roadmap aimed at "identifying the path forward for electric vehicles in Tennessee."[248] TVA is evaluating electric vehicle adoption strategies related to compatibility of charging stations for different vehicles, the impact on the grid, processes to maximize efficiency, and development of smart charging stations.[249]

3. A New Private Bargain

Given the environmental and economic benefits to the TVA service area of decarbonization and the benefits to TVA of increased demand, this may be a propitious time for public or private policymakers to facilitate a new understanding between TVA on the one hand and the cities, local distributors, and electricity customers in the TVA service area on the other hand. The original bargain Congress approved in creating

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241 An example in the Southeast is Savannah, Georgia. *See Savannah to replace 300 cars in municipal fleet with EVs*, GREENWIRE (June 25, 2019), https://www.eenews.net/greenwire/stories/1060654569/search?keyword=savannah.

242 ORD. No. BL2019-1598, *supra* note 145.

243 TVA 2018 10-K, *supra* note 83, at 15.

244 *Id.*

245 *Id.*

246 *Id.*

247 *Id.* at 20.

248 *Id.*

249 *Id.*

TVA was focused on facilitating electrification of the largely rural Southeast, with the primary goals of facilitating economic development while also committing to conservation of the region's resources. In return for electrification, the governments and citizens in the Tennessee Valley gave up the standard mechanisms of private financing (through investor-owned utilities) and political control over their electric utilities, in favor of a more harmonized regional approach inspired by the New Deal's ideals for public power. Later developments shifted the bargain to focus on goals such as the development of coal and nuclear power, while retaining the emphasis on economic development, but TVA's recent resource planning has given short shrift to goals related to conservation of the region's resources, and especially to long-term carbon reduction goals.

A new bargain for TVA could recommit TVA to its dual primary goals of economic development and resource conservation. TVA would commit to accelerating its power generation transition to bring it in line with the deep decarbonization pathway, and in return the cities, local distribution utilities, and major electric customers in the TVA service area would commit to accelerating electrification of the building and transportation sectors. This could spur new forms of private investment while addressing the mismatch between TVA's carbon pathway and the goals of many of its customers. For instance, an accelerated uptake of electric vehicles could take place through purchases of fleet vehicles and adoption of policies and programs (including storage and incentives for vehicle-to-grid connection) that make it easier for the owners of personal motor vehicles to switch to electric vehicles. With increased reliance on vehicle electrification, TVA may be well positioned to collaborate with local governments in building vehicle charging infrastructure while spreading the costs across the region in its rates.[250] Such a bargain would provide TVA an opportunity to maintain or increase total electricity demand—helping to stabilize its revenues (and reduce risk for its investors)—in exchange for TVA's commitment to reduce long-term carbon emissions. It would also provide citizens in the region with an electric grid, buildings and transport system that, at best, will be an engine for new forms of economic growth, and, at the very least, will not leave the area at a competitive disadvantage. The deep polarization regarding climate change may make it difficult for federal or state government policymakers to achieve this type of bargain, particularly given the political and demographic characteristics of TVA's service area, but a

[250] For discussion of some of the challenges and opportunities with electrification presented by traditional utility regulation, see Alexandra B. Klass, *Public Utilities and Transportation Electrification*, 104 IOWA L. REV. 545 (2019).

focus on economic competitiveness by local government and private sector leaders may bypass polarization and provide more viable pathways for reform.

CONCLUSION

A shortcoming of private environmental governance is that no one individual or organization is responsible for allocating resources toward the areas of greatest opportunity and lowest risk of negative spillover effects. No private governance equivalent exists to the Administrator of the Environmental Protection Agency, Chair of the White House Council on Environmental Quality, or chair of the relevant committees in the House and Senate. In the absence of strategic management, it is up to philanthropists, think tanks, NGOs, investment groups, business managers, and scholars to identify opportunities and allocate resources.

This Article takes a step in this direction by exploring the role of private environmental governance in addressing GHG emissions sources that are largely beyond the scope of government regulation. TVA serves as a valuable case study of gap-filling by private initiatives that are directed toward difficult-to-regulate entities. Even if the federal government and state governments in the Southeast do not take a leadership role on climate mitigation a remarkable number of private environmental governance actors and instruments are available. What is lacking is the conceptual framework that will enable public and private policymakers to move from asking "What can government do?" to asking "What can any organization do?" As this Article demonstrates, once that hurdle has been crossed, many instruments are available for private initiatives to increase the motivation for deep decarbonization. Private environmental governance can play a gap-filling role regarding TVA, and the risk of displacing better public options is trivial.

TVA is a good example of a hard-to-regulate organization regarding climate change, but many other organizations in the Southeast, elsewhere in the U.S., and around the world are similarly hard to regulate. Whether because they are quasi-public organizations or organizations located in national or subnational jurisdictions that are resisting climate mitigation, these actors often require new thinking to achieve prompt, major GHG emissions reductions. The TVA case study explored in this Article is just one example of the important role private initiatives can play in the global response to climate change.

APPENDIX 1

Investor Pressure—Bondholders
TVA Debt

Current Outstanding Debt:[251]	
Long term net:	$21.307 billion
Short Term:	$2.332 billion
Total:	$23.639 billion
Future debt: (2019-2023 and "thereafter")	$22.696 billion

Short Term Debt Maturity:[252]	
2019:	$1.216 billion

Long Term Debt Maturity:[253]	
2019	$1.116 billion
2020	$1.092 billion
2021	$1.901 billion
2022	$1.072 billion
2023	$69 million
Thereafter:	$17.474 billion

TVA Bondholders as of June, 2019

TVA Bondholder	Social/ESG Initiative Group	Amount Held ($)
Aberdeen Standard Life Investments	Climate Action 100, IIGCC	2,227,225
Aberdeen Asset Management	Eumedion	1,200,000
Aegon NV	Climate Action 100	199,720,000
Allianz SE	Climate Action 100	22,000,000

251 TVA 2018 10-K, *supra* note 83, at 46.
252 *Id.*
253 *Id.* at 109.

BlackRock	Ceres, ESG Research Australia, Eumedion, Green Bond Principles, IIGCC, SASB	105,705,330
California Public Employees Retirement System (CalPERS	Ceres, Climate Action 100, Eumedion, IIGCC, SASB	300,500,000
Capital Group Cos Inc.	Eumedion, SASB	65,785,000
Charles Schwab Investment Management	SASB	5,614,000
Citigroup	Green Bond Principles	70,990,000
Credit Suisse AG	GIIN, Green Bond Principles	3,160,000
Deutsche Bank AG	GIIN, Green Bond Principles	2,185,000
Fidelity International	SASB	319,000
Goldman Sachs Group Inc	Green Bond Principles	13,800,000
Investec Asset Management	IIGCC	20,631,000
J.P. Morgan	GIIN, Green Bond Principles	47,785,000
Legal & General Group PLC	SASB	3,455,790
Mercer	GIIN	25,000
Metlife	GIIN	623,382,000
Morgan Stanley	GIIN, Green Bond Principles, Ceres, SASB	15,020,000
Natixis SA	Ceres, Green Bond Principles	47,986,000
Neuberger Berman Group LLC	GIIN, Climate Action 100, Ceres, SASB	785,000
Northern Trust Corporation	GIIN, SASB	1,650,000
Nuveen Investments	GIIN, SASB	595,000

TIAA	Ceres, Green Bond Principles	12,525,000
Prudential Financial Inc.	GIIN	184,923,827
Sarasin Partners LLP	IIGCC	3,348,635
SSGA	Ceres, SASB	15,720,000
State Street Corp	SASB	21,328,975
Swiss Life Asset Management	IIGCC	500,000
UBS AG	Green Bond Principles, SASB	26,600,000
UBS Asset Management	Climate Action 100, IIGCC	120,000
Vanguard	ESG Research Australia, GIIN, SASB	617,681,325
Wells Fargo & Co	Ceres, Green Bond Principles, SASB	52,820,933
Total Amount Held		2,490,089,040