

Investing in Failure

How Large Power Companies Are
Undermining their Decarbonization Targets



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EXECUTIVE SUMMARY

Decarbonizing the electricity sector is critical to achieving climate goals. The United Nations Intergovernmental Panel on Climate Change (IPCC) 2018 report found that global carbon emissions must be cut by nearly half by 2030, and then reach net-zero by 2050 if we are to have a 50 percent chance at limiting warming to 1.5° C above pre-industrial levels. The power sector is responsible for 33 percent of U.S. energy related CO₂ emissions according to the U.S. Energy Information Administration (EIA),¹ and decarbonization of the power sector is critical to enabling other sectors, such as transportation, to decarbonize through electrification.²

Three major power companies in the United States—Southern Company, Dominion Energy, and Duke Energy—own approximately 12.7 percent of U.S. generation capacity. The three companies combined serve over 15 million U.S. customers and are the dominant providers across the Southeast region of the United States.³ They are also directly responsible for 4.2 percent of total U.S. CO₂ emissions and 12.4 percent of U.S. power sector CO₂ emissions.⁴

Pressed by investors to act, each of these three companies has recently announced decarbonization goals for 2030 and 2050.

- Southern Company announced an emissions reduction goal of “low-to-no” carbon emissions by 2050.⁵
- Dominion Energy announced on February 11, 2020 that it will expand its previous emissions reductions goals and commit to achieving net-zero emissions by 2050.⁶

¹ EIA. “How much of U.S. carbon dioxide emissions are associated with electricity generation?”. October 2019. Available at: <https://www.eia.gov/tools/faqs/faq.php?id=77&t=11>.

² Electrification means converting energy end uses that have been powered by fossil fuels to run on electricity in order to reduce greenhouse gas emissions. Energy end uses include transportation, space heating, water heating, etc.

³ EIA form 861m, October 2019 Sales. Available at <https://www.eia.gov/electricity/data/eia861m/>.

⁴ U.S. Energy-Related Carbon Dioxide Emissions, 2018. U.S. EIA, November 2019. Available at https://www.eia.gov/environment/emissions/carbon/pdf/2018_co2analysis.pdf; EIA Webpage, “How much of U.S. carbon dioxide emissions are associated with electricity generation?” October 2019; Dominion Energy, Metrics: Our story in numbers Webpage, available at <https://sustainability.dominionenergy.com/metrics/>; Duke Energy, Environmental Performance Metrics Webpage, available at <https://sustainabilityreport.duke-energy.com/operations/environmental-performance-metrics/>; Southern Company, Climate Webpage, available at <https://www.southerncompany.com/corporate-responsibility/environment/air-and-climate.html>.

⁵ Southern Company. Climate Webpage.

⁶ Dominion Energy. Dominion Energy Sets New Goal of Net Zero Emissions by 2050. February 11th, 2020. Available at: <https://news.dominionenergy.com/2020-02-11-Dominion-Energy-Sets-New-Goal-of-Net-Zero-Emissions-by-2050>.



- Duke Energy announced a goal in 2019 to reduce its emissions 50 percent below 2005 levels by 2030 and to be net-zero by 2050.⁷

While these stated goals are a necessary first step to be applauded, none of the three companies have published plans detailing how their planned capital expenditures and retirements align with their decarbonization goals. In fact, the companies have each provided very little detail at all on how they plan to achieve their stated goals. Utilities appear in some cases to simply be responding to state pressures or requirements rather than demonstrating the independent leadership needed to achieve ambitious decarbonization targets. Investors must remain vigilant to ensure that the companies are actually adopting a comprehensive, enterprise-wide strategy, and are on track to decarbonize by 2050.

This report analyzes planning documents filed by utilities with state regulators that detail these companies' actual investment plans and priorities, examining the actions undertaken by the three companies to meet these goals. It builds on Synapse's extensive experience delving into utility planning processes and regulated utility dockets to assess whether the companies are likely to achieve these goals given their current trajectories. We find that contrary to what Southern Company, Dominion Energy, and Duke Energy say on their websites, in television ads, and in shareholder reports and pamphlets, the three companies are thus far taking minimal actions to decarbonize their electricity systems. This report demonstrates that none of the three companies examined in this report will meet their 2050 greenhouse gas reduction goals under their current resource plans.

Company actions toward decarbonization would include retiring uneconomic coal and investment in zero-carbon renewable resources; nonetheless, the companies have continued to operate the majority of the plants in their coal fleets despite the fact that they are uneconomic. They could be meeting customer needs using cleaner resources while also saving them money. Specifically:

- Approximately two-thirds of the coal capacity the companies had online in 2012 is still online today, despite falling gas and renewable prices;
- The vast majority (75 percent) of the companies' remaining coal capacity is currently planned to still be online beyond 2030; and
- Over the next 20 years, the companies have stated retirement dates for only 19 GW of the total 39 GW of coal capacity still online.

Further, new gas-fired capacity has become an increasing percentage of the companies' resource portfolios, and current resource plans demonstrate a continued reliance on new gas units as a replacement for retiring coal and as a means of meeting growing electricity demand:

- Of the coal plants that the three companies have retired since 2012, 72 percent of retired capacity has been replaced by carbon-emitting gas capacity.

⁷ Culbert, Erin. Duke Energy sets its sights on net-zero carbon by 2050. *Illumination*. September 17th, 2019. Available at: <https://illumination.duke-energy.com/articles/duke-energy-sets-sights-on-net-zero-carbon-by-2050>.

- According to their current resource plans, the companies plan to add another 21 GW of new natural gas combined cycle and combustion turbine units over the next 10 to 20 years.
- The 22 GW of planned new gas amounts to 1.2 GW of new fossil resources added for every one GW of planned coal retirements over the next 20 years.
- All 22 GW of planned new gas and nearly 14 GW of new gas that came online since 2012 will outlive the companies' 2050 climate commitments (assuming a 40-year plant lifetime), meaning the companies may have to retire plants with remaining useful life. Ratepayers or shareholders will continue to pay for these stranded assets though they no longer receive any benefit from them.

Southern Company, Dominion Energy, and Duke Energy are making these investments in new gas plants and pipeline infrastructure without considering the risks of stranded asset potential from fossil assets that will outlive the companies' 2050 commitments—and without considering the climate impact of upstream methane leakage, which the companies should at least attempt to quantify in their planning as part of their commitment to decarbonization.

Further reducing the likelihood that the companies will achieve their decarbonization goals, Southern Company, Dominion Energy, and Duke Energy are not adequately evaluating emissions-free alternatives. The three companies lag leading utilities in investing in replacement resources, including energy efficiency and renewable investments. In addition, the companies' grid modernization efforts are not equal to the task of transforming to a decarbonized grid. This investment gap in renewables, energy efficiency, and grid modernization is occurring at the same time the companies have invested as much as hundreds of millions in capital expenditures in the continued operation of aging coal plants that should have been retired. Finally, as the number of solar facilities interconnecting to the grid has increased, the companies are discouraging competition by lowering the avoided cost rates paid to solar facilities, adding significant solar integration charges, and making the interconnection process long and costly.

Our analysis of the companies' resource plans finds that all three companies are missing the mark. A "zero by 2050" goal requires substantial CO₂ emissions reductions by 2040. However, looking ahead to 2040, Southern Company, Dominion Energy, and Duke Energy's generating fleets are all heading to emit roughly double the quantity of CO₂ emissions required to decarbonize by 2050 (see Figure 1 through Figure 6 below, see Section 5.1 for full sourcing and methodology). Further, with each company's heavy reliance on gas, even the companies that show a downward emissions trajectory through 2040 will see their emissions rapidly plateau at or near the 2040 levels unless they make a drastic change in future gas build plans.

This report projects generation levels using these business-as-usual (BAU) generation assumption. Only a handful of each company's subsidiary utilities provided future generation projections, and even for those utilities that provided such projections, there is a great deal of uncertainty around what will actually materialize. In this case, however, uncertainty also means there is a significant opportunity for the utilities to do better.

If the companies, for example, shut down their fossil units earlier than currently planned, build less gas than planned, ramp up renewable deployment, or minimize how much they run their remaining fossil units, then their emissions will be lower than projected here. Future analysis based on more transparent planning and actionable commitments from the utilities could show a different story.

Figure 1. Southern Company projected generation (2019–2040)

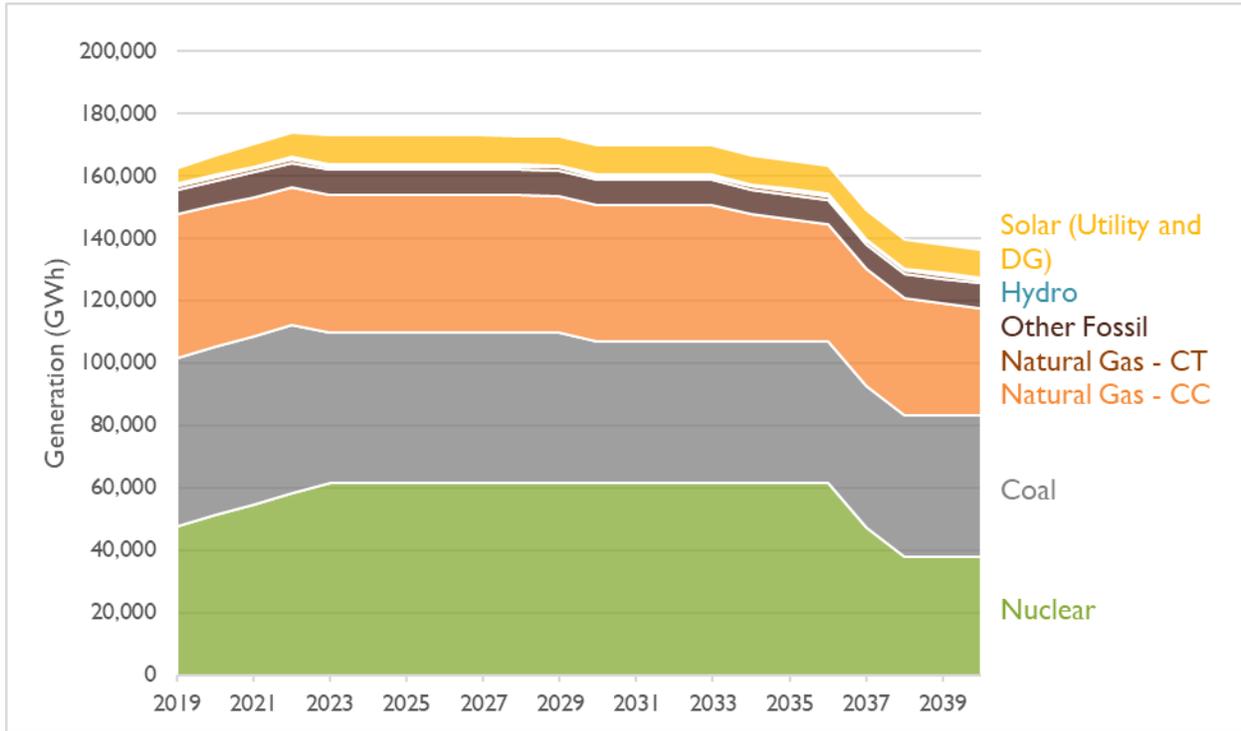


Figure 2. Southern Company projected emissions (2019–2040)

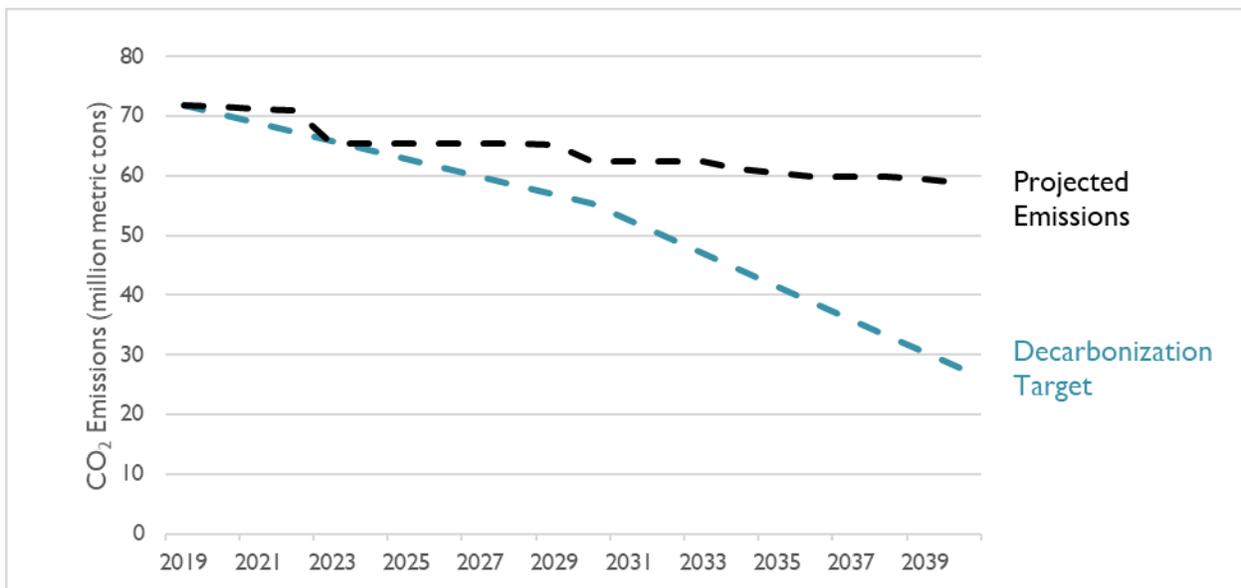


Figure 3. Dominion Energy projected generation (2019–2040)

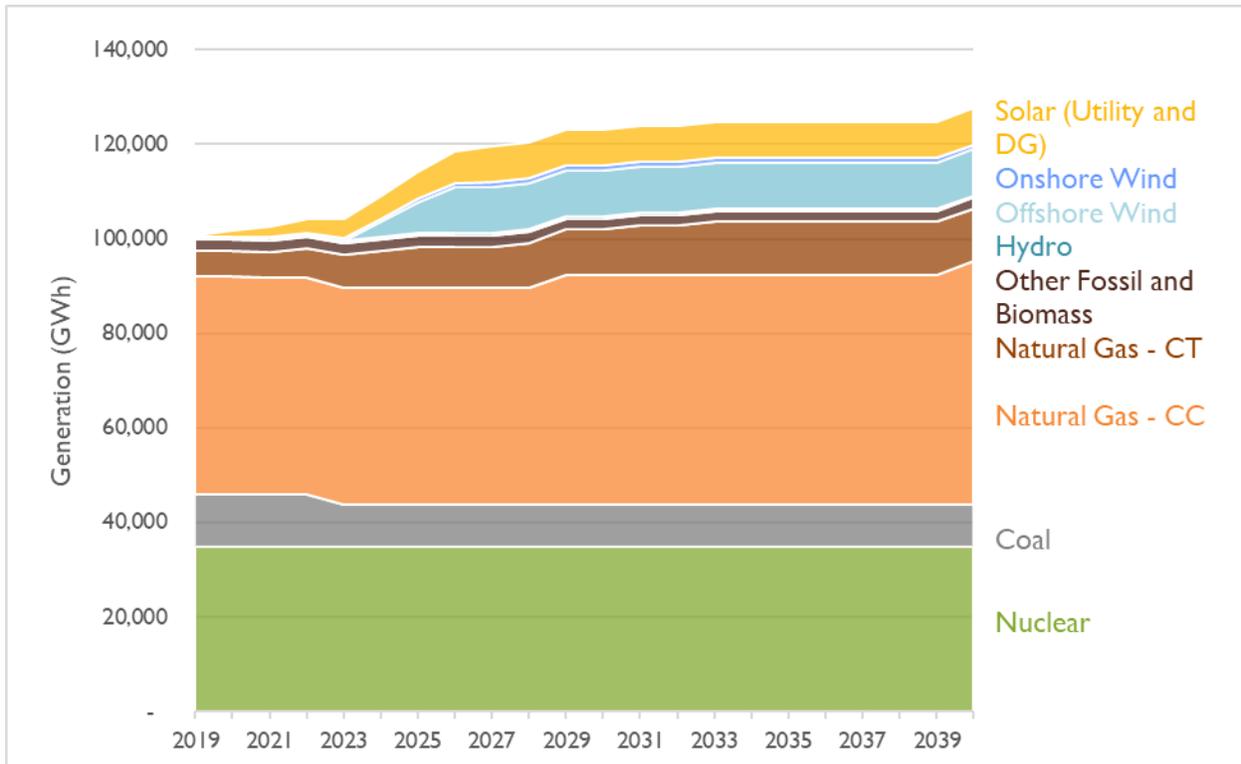


Figure 4: Dominion Energy projected emissions (2019–2040)

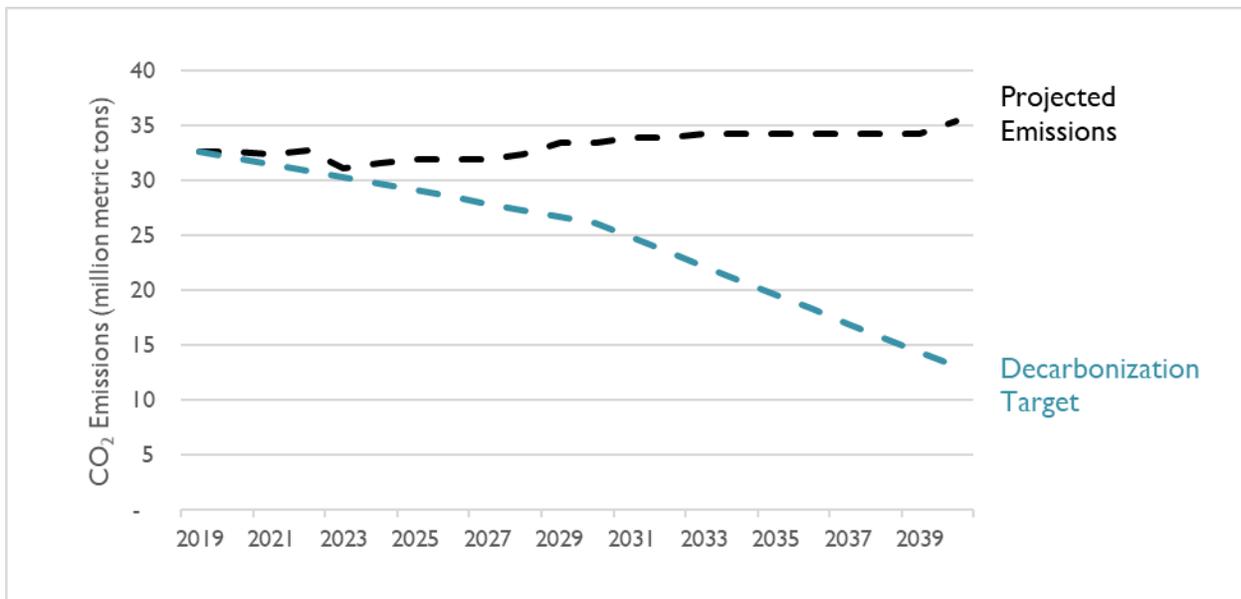


Figure 5: Duke Energy projected generation (2019 - 2040)

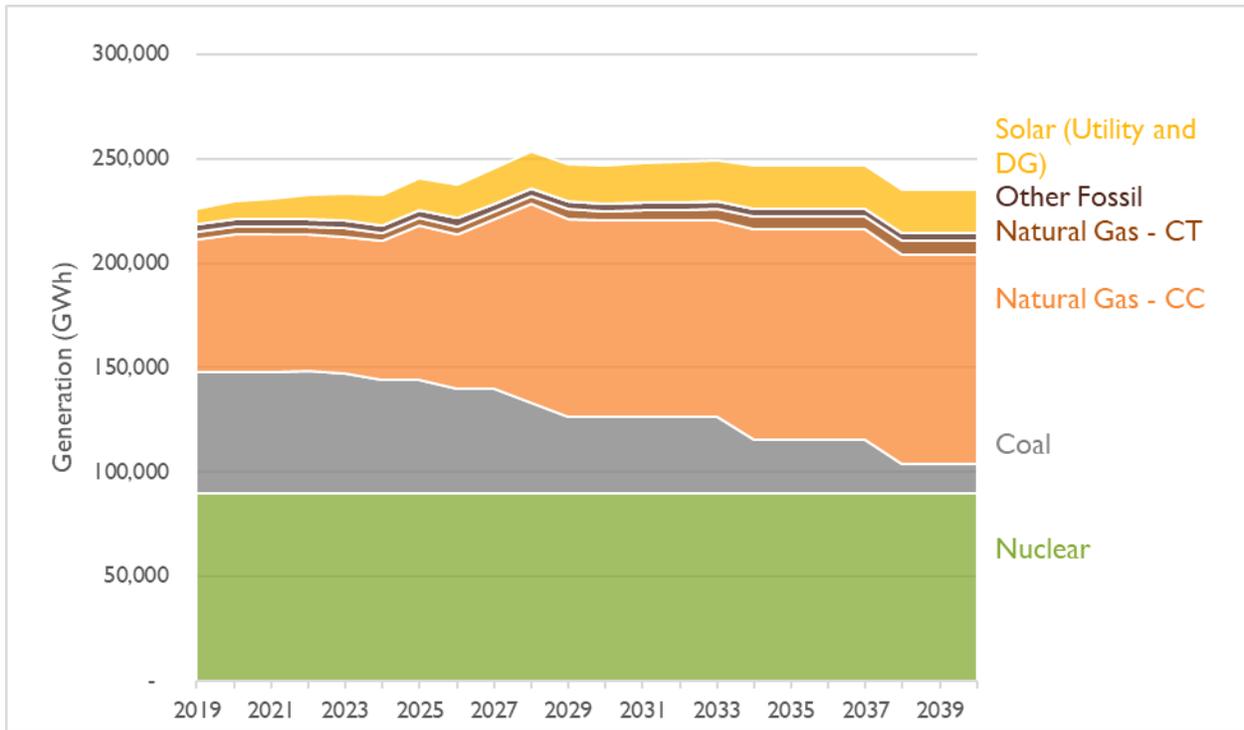
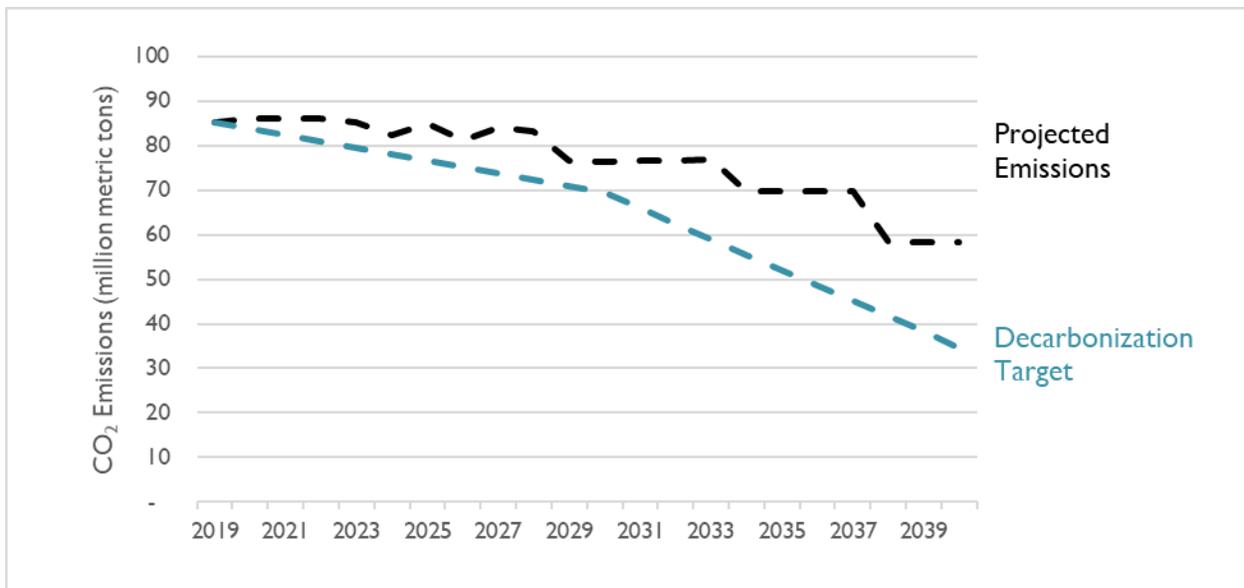


Figure 6: Duke Energy projected emissions (2019 - 2040)



Based on each company's current performance, the following actions are necessary to put the companies on the path to decarbonization by 2050: (1) develop science-based CO₂ trajectories upon which all future plans and actions should be based; (2) conduct robust retirement and replacement analyses to determine the least-cost path to retire each company's existing fossil fleet and replace it with alternative zero-carbon portfolios; (3) invest in renewables and demand-side resources to meet all

future resource needs; (4) invest in grid-modernization solutions in tandem with retirement of existing resources and development of renewables; and finally (5) evaluate and plan for changing system needs, including load growth driven by electrification instead of traditional steady demand.



1. PURPOSE OF THE REPORT

The United Nations Intergovernmental Panel on Climate Change (IPCC) published a report in 2018 which found that global carbon emissions have to be cut by nearly half by 2030, and then reach net-zero by 2050, if we are to have a 50 percent chance at limiting warming to 1.5° C above pre-industrial levels. Decarbonizing the electricity sector is critical to achieving this goal, by directly reducing emissions from the power sector and enabling other sectors to decarbonize. These other sectors, like the transportation sector, will have to electrify at the same time that power grids transition away from fossil fuels. For that reason, the IPCC report made clear that decarbonizing the electric power sector is central to scenarios that limit warming to either 1.5°C or 2°C. Pressed by investors to act, Southern Company, Dominion Energy, and Duke Energy have committed to reducing emissions. While their stated goals are a necessary first step to be applauded, investors must remain engaged and confirm that the companies are on track to decarbonize. The purpose of this report is to evaluate where the companies are today on their journey. We assess how close each company is likely to achieving decarbonization based on the carbon dioxide (CO₂) trajectory associated with its current and planned actions, and we discuss the minimum actions needed for each of the companies to actually decarbonize by 2050.

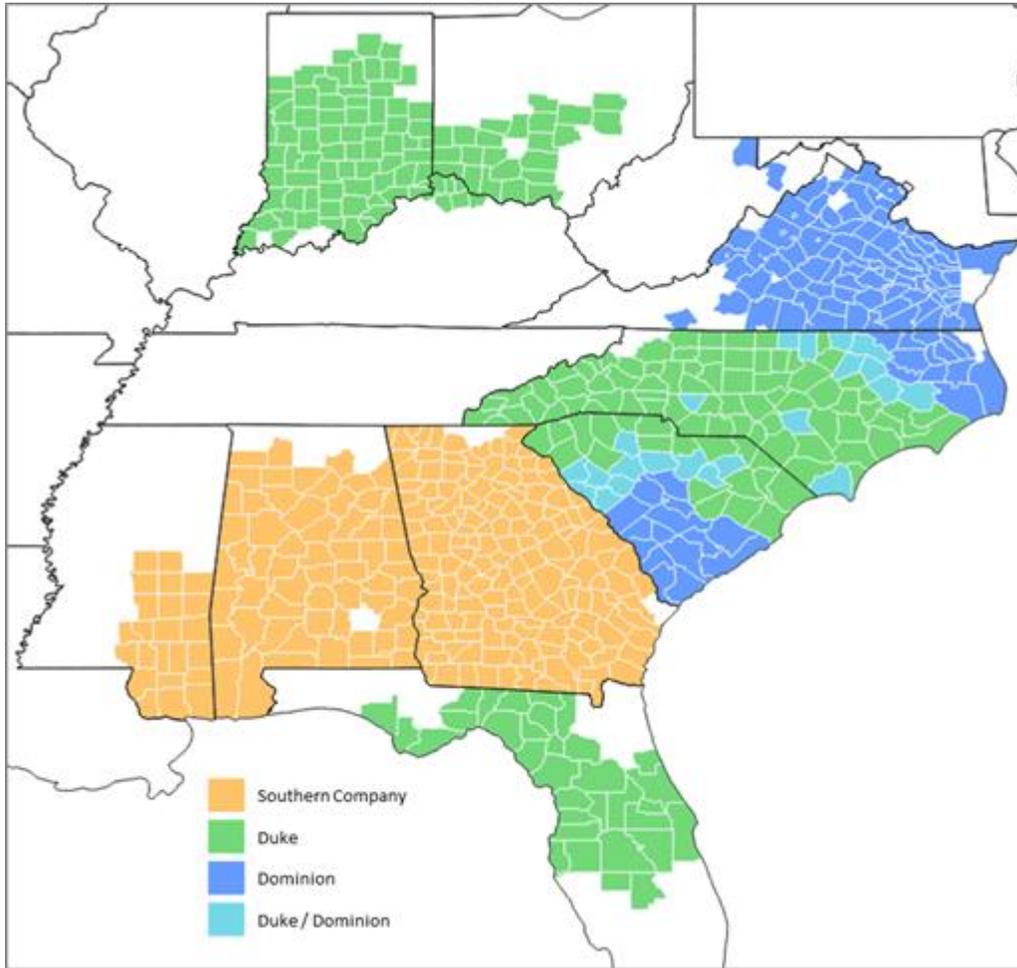
Section 2 provides background on each of the three companies. Section 3 reviews the three companies' decarbonization goals and other stated climate and renewable commitments from company websites, shareholder annual reports, and other materials. Section 4 examines what each subsidiary utility is actually doing based on a review of its recent actions (between 2012 and present), and its stated plans going forward (through 2050). Specifically, we look at coal plant retirements, investments in existing coal plants, investments in new gas plants and gas infrastructure, penetration of renewables, investment in demand-side management, and grid modernization efforts. Section 5 analyzes our findings regarding each utility's actions and plans relating to traditional fossil resources and renewables to get a full picture of each Company's aggregate future resource plans. We convert each Company's actions into likely generation and CO₂ trajectories and discuss why current plans make it unlikely that any of the three companies will decarbonize by 2050. Finally, Section 6 describes minimum actions that each Company must take in order to decarbonize by 2050. These recommendations represent actions that are necessary, but not sufficient, to decarbonize by 2050.

2. THE THREE COMPANIES PRODUCE 4 PERCENT OF ECONOMY-WIDE U.S. CO₂ EMISSIONS

Southern Company, Dominion Energy, and Duke Energy have been serving power customers in the United States for over a century now. The companies control a large portion of the electricity service territory in the southeastern and midwestern regions of the United States as shown in Figure 7.



Figure 7: Service territory of Southern Company, Dominion Energy, and Duke Energy



Source: EIA 861, 2018.

In this figure, counties that are colored non-white are at least partially served by Southern Company, Duke, Dominion, or some combination of those three utilities. Note that some customers in many of these counties may not be served directly by these three utilities and may instead have a co-op or other entity as a distribution utility. In many cases, these co-ops may ultimately purchase electricity from Southern Company or one of the other two major utilities. In addition, in many cases, some customers in the identified counties are served by other large utilities (e.g., Tennessee Valley Authority or Indianapolis Power & Light).

Together, the companies' subsidiary utilities control over 10 percent of U.S. generation capacity. As a group they are directly responsible for 4.2 percent of total U.S. emissions, and 12.4 percent of U.S. power sector emissions.⁸ Table 1 shows each Company's total 2018 emissions.

⁸ U.S. Energy-Related Carbon Dioxide Emissions, 2018. U.S. EIA, November 2019; EIA webpage, "How much of U.S. carbon dioxide emissions are associated with electricity generation?" October 2019; Dominion Energy, "Metrics: Our story in numbers" webpage; Duke Energy, "Environmental Performance Metrics" webpage; Southern Company, "Climate" webpage.

Table 1: Company emissions as a percent of U.S. power sector and total emissions (2018)

	Total Company Emissions (million metric tons)	% of U.S. Power Sector Emissions	% Total U.S. Energy-Sector Emissions
Southern Company	102	4.9%	1.6%
Dominion Energy	28	1.6%	0.5%
Duke Energy	105	6.0%	2.0%
Companies Total	235	12.4%	4.2%
U.S. Power Sector Emissions	1,763		1.6%
Total U.S. Energy-Sector Emissions	5,269	4.9%	0.5%

Source: U.S. Energy-Related Carbon Dioxide Emissions, 2018. EIA, November 2019; EIA webpage: “FAQ How much of U.S. carbon dioxide emissions are associated with electricity generation?” Dominion Energy, “Metrics: Our story in numbers” webpage; Duke Energy, “Environmental Performance Metrics” webpage; Southern Company, “Climate” webpage.

The three companies combined serve 15 million U.S. customers⁹ through the 10 subsidiary electric utilities listed in Table 2. The three companies’ stated decarbonization goals cover all subsidiaries, which include not just electric utilities but also gas utilities and energy companies that own generation assets. However, for the purposes of this report, we are focusing on just the subsidiary electric utilities listed in Table 2.

Table 2: Subsidiary electric utilities for Southern Company, Dominion Energy, and Duke Energy

Holding Company	Subsidiary
Southern Company	Mississippi Power
	Alabama Power
	Georgia Power
Dominion Energy	Virginia Electric & Power
	Dominion South Carolina
Duke Energy	Duke Energy Carolinas
	Duke Energy Progress
	Duke Energy Florida
	Duke Energy Indiana
	Duke Energy Ohio (Duke Energy Kentucky)

Southern Company provides electricity to the approximately 4.3 million customers¹⁰ in the states of Georgia, Alabama, and Mississippi.¹¹ Until recently, Southern Company also owned Gulf Power in Florida. In 2018, Southern Company emitted 102 million metric tons of CO₂ company-wide, and power

⁹ EIA form 861m, October 2019 Sales. Available at <https://www.eia.gov/electricity/data/eia861m/>.

¹⁰ *Ibid.*

¹¹ Financial issues stemming from construction issues at several nuclear plants forced Southern Company to sell-off Gulf-Power in Florida. Sale of the assets to NextEra was finalized in January.

generation activities accounted for the majority of those emissions.¹² This is equivalent to 24 metric tons per customer and 1.6 percent of all carbon emissions in the United States in 2018 (see Table 1).

Dominion Energy is the smallest of the three companies, serving 3.4 million electricity customers¹³ in the states of Virginia, South Carolina (through the acquisition of South Carolina Electric and Gas) and parts of North Carolina. Dominion's annual energy consumption has remained widely unchanged over the past decade. Dominion generated 28 million metric tons of CO₂ company-wide in 2018,¹⁴ accounting for 0.5 percent of total U.S. emissions.

Duke Energy serves 7.3 million electricity customers across the states of North Carolina, South Carolina, Florida, Indiana, Ohio, and Kentucky.¹⁵ Duke Energy reported its customer energy consumption and peak demand decreased by over 16,700 gigawatt-hours in 2018.¹⁶ The company reported 105 million metric tons of CO₂ emissions in 2018.¹⁷ This is roughly equivalent to 2 percent of all carbon emissions in the U.S. in the same year.

¹² Southern Company. Climate Webpage.3

¹³ EIA form 861m, October 2019 Sales.

¹⁴ Dominion Energy Metrics: Our story in Numbers.

¹⁵ EIA form 861m, October 2019 Sales.

¹⁶ Duke Energy. 2018 Sustainability Report. 2019. Available at: <https://sustainabilityreport.duke-energy.com/downloads/2018-Duke-Energy-Sustainability-Report-Complete.pdf>.

¹⁷ Duke Energy. "Environmental Performance Metrics." 2018.



Defining Capacity and Generation

Capacity, expressed in megawatts (MW), represents the maximum amount of power a generator can provide on an instantaneous basis. Capacity can be expressed in several ways:

- Nameplate capacity is the official maximum rating of the equipment from the physical nameplate on the equipment. This represents the output from the unit under specific operating conditions as defined by the manufacturer.
- Summer capacity/ winter capacity is used for thermal generators, such as coal and gas plants, to represent the maximum power the company can rely on the unit to provide given seasonal factors such as air and water temperature.
- Firm capacity is generally used for renewables to represent the maximum output from the resources at the time of system peak. Firm capacity can be expressed based on summer peak, winter peak, or total annual system peak.

Generation, expressed in megawatt hours (MWh), refers to the quantity of electricity produced over time by a specific resource. It is important to note that CO₂ emissions are directly attributed to generation, not to capacity.

Table 3: Southern Company, Dominion Energy, and Duke Energy's nameplate capacity by resource type (MW) and as percent of total U.S. capacity (%)

Resource Type	Southern Company		Duke Energy		Dominion Energy		Combined U.S. Total	
	MW	% U.S. total	MW	% U.S. total	MW	% U.S. total	MW	% U.S. total
Natural Gas – Combined Cycle	7,477	2.5%	11,804	3.9%	8,855	2.9%	303,851	9.3%
Natural Gas – Steam Turbine	3,758	2.4%	1,276	0.8%	394	0.2%	158,931	3.4%
Natural Gas – Combustion Turbine	2,052	2.6%	10,909	13.7%	3,134	3.9%	79,663	20.2%
Coal	15,030	6.0%	18,781	7.5%	5,420	2.2%	249,427	15.7%
Oil	911	2.6%	1,936	5.5%	2,348	6.7%	35,192	14.8%
Nuclear	5,818	5.7%	11,240	10.9%	4,362	4.2%	102,651	20.9%
Hydro	2,391	3.0%	1,372	1.7%	523	0.7%	79,777	5.4%
Solar	2,547	7.1%	4,141	11.6%	205	0.6%	35,761	19.3%
Wind	-	0%	-	0.0%	-	-	101,356	0.0%
Pumped Storage	-	0%	2,070	9.5%	2,070	9.5%	21,871	18.9%
Other	-	0%	-	0.0%	-	-	26,676	0.0%
Total	39,984	3.3%	63,528	5.3%	27,310	2.3%	1,195,156	10.9%

Source: EIA-860m 2019, https://www.eia.gov/electricity/annual/html/epa_04_03.html.

Table 4: Southern Company, Dominion Energy, and Duke Energy's generation by resource type and as a percent of total U.S. generation

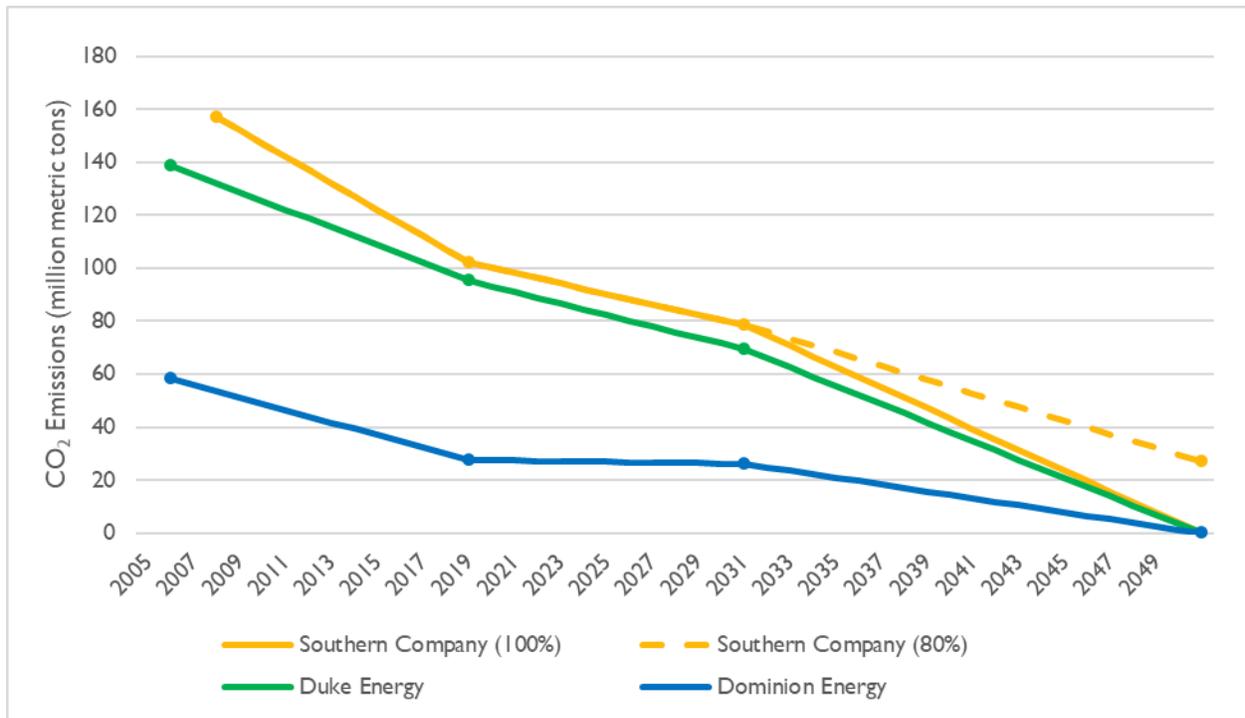
Resource Type	Southern Company		Duke Energy		Dominion Energy		Combined U.S. Total	
	GWh	% U.S. total	GWh	% U.S. total	GWh	% U.S. total	GWh	% U.S. total
Natural Gas – Combined Cycle	46,113	3.8%	63,261	5.2%	45,873	3.8%	1,218,743	12.7%
Natural Gas – Steam Turbine	7,877	7.5%	3,431	3.3%	1,741	1.7%	104,397	12.5%
Natural Gas – Combustion Turbine	1,154	0.8%	3,870	2.7%	722	0.5%	140,801	4.1%
Coal	53,931	6.2%	58,613	6.7%	11,031	1.3%	870,996	14.2%
Oil	68	0.7%	308	3.2%	193	2.0%	9,538	6.0%
Nuclear	47,763	6.5%	89,473	12.2%	35,034	4.8%	736,164	23.4%
Hydro	668	0.3%	-	0%	502	0.2%	251,366	0.5%
Solar	2,450	3.6%	3,385	4.9%	279	0.4%	68,458	8.9%
Wind	-	0%	-	0%	-	0%	272,838	0%
Other	-	0%	-	0%	-	0%	103,692	0%
Total	160,025	4.2%	222,341	5.9%	95,375	2.5%	3,776,993	12.65%

Source: EIA-923m November 2019, EIA 923 2018.

3. THE COMPANIES HAVE AMBITIOUS DECARBONIZATION GOALS FOR 2030 AND 2050

Southern Company, Dominion Energy, and Duke Energy have all publicly announced decarbonization goals for 2030 and 2050. Each company has also spent considerable time and effort publicizing its commitment to decarbonization and a clean energy future on its websites and in various company reports. Figure 8, below, shows their stated targets through 2050.

Figure 8: Emissions targets for holding companies based on stated interim and long-term goals



Source: Historical data compiled from individual company reports. Projected data calculated based on company-stated goals in: (1) Duke Energy. 2018 Duke Energy Sustainability Report. April 2019; (2) Dominion Energy. Climate Report. November 2018; (3) Southern Company. Carbon Disclosure Report. 2017.

Southern Company has announced an emissions reduction goal of “low-to-no” carbon emissions by 2050. The company presented a range for its climate efforts where “low” means an 80 percent carbon emissions reduction from its 2007 baseline year by 2050 and “no” means a 100 percent reduction.¹⁸ The difference between the “low” and “no” commitment is considerable, with the “no” scenario representing a reduction of an additional 31.4 million metric tons of carbon emissions than under the “low” scenario. The company has been broadcasting its commitment to a low-carbon future in many

¹⁸ Southern Company. *Climate* Webpage.

recent publications, including the its *2018 Response to Climate Change* report, stating, “No U.S. utility is doing more than Southern Company to assure there is an affordable and reliable path to a low- to no-carbon future for the utility industry and for the U.S. economy as a whole.”¹⁹ This sweeping claim is impossible to verify since it is not clear if the company is committed to a net-zero or just an 80 percent reduction goal.

Dominion Energy announced on February 11, 2020 that it will expand its emissions reductions goals and commit to achieving net-zero emissions by 2050.²⁰ Prior to this announcement, the company’s goal was an 80 percent emissions reduction from 2005 emissions levels by 2050.²¹

Finally, Duke Energy set a goal in September 2019 to reduce its emissions 50 percent below 2005 levels by 2030 and to be net-zero by 2050.²² These goals mean Duke Energy needs to emit no more than 69 million metric tons per year by 2030 to meet its interim goal. To meet this goal, the company will have to reduce its emissions by 26 million metric tons over the next decade.

4. DESPITE COMMITMENTS, THERE IS LITTLE PROGRESS

Southern Company, Dominion Energy, and Duke Energy have all committed to decarbonize by 2050. However, none of the three companies have published plans detailing how their planned capital expenditures and retirements align with their decarbonization goals. In fact, the companies have each provided very little detail at all on how they plan to achieve their stated goals.

In this section, we review a wide array of utility cases (referred to as dockets) relating to: (a) long-term resource planning (integrated resource planning (IRP) dockets); (b) customer rate setting and approval to spend capital (rate cases); (c) approval for spending on environmental projects (environmental riders); (d) reconciliation of utility fuel cost spending with what was charged to customers (fuel cost recovering dockets); (e) preapproval to build a new plant (certificates of public need and necessity); and (f) updating of rates paid to distributed energy resources through Net Energy Metering and Public Utilities Regulatory Policies Act (PURPA) avoided cost dockets. Our review describes the ways in which utilities persist in traveling the same paths they always have, despite the full range of alternatives. We find that contrary to what Southern Company, Dominion Energy, and Duke Energy say on their websites,

¹⁹ Southern Company. *Climate Change Response*. 2018. Available at: <https://www.southerncompany.com/content/dam/southern-company/pdf/corresponsibility/The-Southern-Company-2018-CDP-Climate-Change-response.pdf>.

²⁰ Dominion Energy. *Dominion Energy Sets New Goal of Net Zero Emissions by 2050*. February 11th, 2020. Available at: <https://news.dominionenergy.com/2020-02-11-Dominion-Energy-Sets-New-Goal-of-Net-Zero-Emissions-by-2050>.

²¹ Dominion Energy. *Dominion Energy Sets New Goal of Net Zero Emissions by 2050*. February 11th, 2020.

²² Culbert, Erin. *Duke Energy sets its sights on net-zero carbon by 2050*. *Illumination*. September 17th, 2019. Available at: <https://illumination.duke-energy.com/articles/duke-energy-sets-sights-on-net-zero-carbon-by-2050>.

in television ads, and in glossy shareholder reports and pamphlets, the three companies have yet to make plans that reflect the intention to decarbonize their electricity systems.

While the three companies have taken some action to retire coal capacity, the vast majority of each company's coal units online in 2012 remain online today (Table 5). Of the coal plants that these companies have retired since 2012, 72 percent of the capacity has been replaced by carbon-emitting gas generation (see Section 4.3 below). Additionally, instead of robustly evaluating replacement portfolios and investing in energy efficiency, low-cost renewables, and essential grid modernization, each company is continuing to invest capital into aging and uneconomic coal plants and to build new generation fueled by gas.

4.1. THE COMPANIES' STATUS QUO PLANNING PROCESSES ARE NOT ADEQUATE

Historically, utility planning practices have focused on building new fossil resources, investing in aging assets, and minimally investing in grid modernization and renewables. The Southern Company, Dominion Energy, and Duke Energy utilities, like most other utilities, historically built their resource portfolios around large central steam generators. They relied on nuclear and coal plants to meet their baseload needs, natural gas combined-cycle plants more recently to meet intermediate needs, and natural gas turbines to provide peaking capacity. Renewables (with the exception of hydroelectric generators) were not a substantial part of these companies' resource mixes. When renewables were built, they served primarily to meet Renewable Portfolio Standards (RPS) or other regulations and were often publicized to enhance corporate reputations. This is status quo resource planning.

Over the past 10 years, two of the three resources that Southern Company, Dominion Energy, and Duke Energy utilities have historically relied upon, nuclear and coal, became uneconomic or otherwise challenged in much of the United States. This left gas-fired generators, along with a plethora of cost-competitive carbon-free supply- and demand-side alternatives (including renewables, battery storage, energy efficiency, and demand response) to replace aging coal fleets and meet any future load growth.

Unfortunately, when the three companies evaluate replacement options for retiring coal capacity, they tend to approach the analysis inadequately in three ways. First, they focus on replacing the exact asset and services being retired, rather than evaluating system needs in the absence of the retired resource. This is critical, because while the utilities' needs may approximate the resource that was retired, with changing system conditions and other resource additions elsewhere on the system, it is likely that the system needs will differ in key ways from the services that the retiring resources provided. In fact, those needs can likely be better met by alternative resource options. To provide a simple example, a 500 MW coal unit that is retired at a specific location need not be replaced with 500 MW of thermal capacity at that same location. Rather, the retiring coal unit might be replaced with a portfolio of different resources sited at strategic locations on the grid.

Even when the utilities do consider alternatives to thermal generators, they tend to structure the analysis to favor traditional fossil resources as replacement options. They do this either by limiting the analysis to the evaluation of fossil resources from the start, or by utilizing outdated or incorrect

assumptions that disadvantage renewables and demand-side resources in the analytical process. A utility's alternative analysis generally does not cover a full suite of alternatives or use robust and objective inputs and assumptions.

Finally, utility analyses are generally divorced from their parent company's stated climate goals. While some of the companies' subsidiary utilities have evaluated scenarios with CO₂ prices and higher penetrations of renewables, none of them explicitly evaluate how the preferred and alternative portfolios perform in meeting the company's state climate goals. In fact, as we saw in Duke Indiana (discussed in the Duke Energy Indiana, 2018 Integrated Resource Plan box below), the utility planning divisions sometimes explicitly ignore the corporate goals and classify them as irrelevant to their planning processes.

Throughout section 4 of this report, call-out boxes offer illustrative examples of actions taken by a subsidiary utility of Southern Company, Dominion Energy, or Duke Energy which are at odds with a corporate commitment to decarbonize.

Duke Energy Indiana, 2018 Integrated Resource Plan

The connection between the companies' stated climate goals and their actual resource planning is too often tenuous or non-existent. For example, Duke Energy prepared a "2017 Climate Report to Shareholders" that included an analysis of long-term system decarbonization. But when asked about that report in the 2018 Integrated Resource Planning process in Indiana, Duke Indiana refused to provide any substantive information about the analysis. Indeed, the company responded to questions about the "Climate Report to Shareholders" by saying that:

"Duke Energy Indiana objects to this informal request as it is not relevant to Duke Energy Indiana's 2018 IRP as the assumptions for the referenced climate report were not used for Duke Energy Indiana's 2018 IRP. Therefore, this request was not reasonably calculated to lead to admissible evidence in this process and Duke Energy Indiana objects to providing the requested information. Duke Energy further objects to this request as overbroad and unduly burdensome."

If Duke were actively and sincerely working to plan for long-term decarbonization then one might reasonably expect the company's planners to connect the long-run analysis in the Climate Report to Shareholders with the state-specific IRP analyses.

Commissions in some states have addressed certain shortcomings in the planning process by incorporating into IRP dockets processes that allow stakeholders to review and provide feedback directly to the utility on its inputs, assumptions, and methodologies. Emerging Comprehensive Electricity Planning practices (sometimes called Integrated Grid Planning)²³ tap emerging digital, computing, and

²³ NARUC-NASEO Task Force On Comprehensive Electricity Planning Fact Sheet <https://pubs.naruc.org/pub/OAB39B39-90A0-06B0-5973-A0A320AF3159>.

communications technology—together with falling costs for distributed energy resources, utility-scale renewables and storage—to identify how generation, transmission, and distribution investments can be optimized to meet customer energy needs.²⁴ However, rather than implement these or other comprehensive to robustly evaluate all available resources, the companies continue to pursue traditional status quo planning processes.

4.2. THE COMPANIES ARE NOT RETIRING AGING AND UNECONOMIC COAL PLANTS FAST ENOUGH

Southern Company, Dominion Energy, and Duke Energy prolong operation of their coal plants, despite clear economic analysis and market signals demonstrating that customers would be better served if the plants were retired and replaced by alternative resource portfolios as developed through more robust and comprehensive planning processes. Coal is the most carbon intensive fuel in wide-spread use in the electric sector, and failure by the three companies to rapidly retire their aging coal capacity is a missed opportunity to advance decarbonization goals.

The three companies have been investing substantial capital, both for routine plant upgrades (referred to as sustaining capital costs) and environmental projects in recent years. They make these investments with little (if any) robust economic analysis, justifying the investment relative to retirement and investment in alternative resource portfolios. Additionally, their utilities are uneconomically operating coal units and running (or dispatching) the coal units even when they could procure electricity from elsewhere for a lower cost.²⁵ Because the costs associated with uneconomic dispatch behavior can be passed onto customers through higher fuel and operational costs, the companies face no short-term financial consequence for delaying closures.

TWO-THIRDS OF COMPANIES' COAL CAPACITY REMAINS IN THEIR RESOURCE PORTFOLIOS

We evaluate each company's actions to retire its coal fleet since 2012, selecting that year as a starting point based on two general trends that began around this time: (1) increased environmental regulations limiting emissions, which required capital investments at many coal plants for compliance; and (2) the rise of fracking on a commercial scale in the United States, which ushered in an era of falling gas prices. We find that while each company has taken some action to retire coal capacity (approximate 30 percent has been retired), nearly two-thirds of each company's coal units that were online in 2012 remain online today (Table 5).

²⁴ Comprehensive Electricity Planning considers the full range of investment options across the electricity system to cost-effectively meet current and emerging grid needs such as increased flexibility and resilience.

²⁵ Specifically, they could be procuring electricity bilaterally, such as Southern Company does when selling energy between one subsidiary utility and another, or from the market, as Virginia Power does as part of the PJM wholesale market or Duke Indiana does as part of the MISO wholesale market.

Table 5: Change in the companies' coal capacity: 2012 through present

MW	% of 2012 Total Capacity	Status
Dominion		
8,658		Total Capacity Online in 2012
1,003	12%	Retired 2013-2014
213	2%	Converted to biomass in 2013
294	3%	Converted to gas 2018
1,069	12%	Retired in 2019
2,579	30%	Total Coal Capacity taken offline 2012 – 2020
6,079	70%	Coal capacity still online
Southern Company		
24,404		Total Capacity Online in 2012
5,322	22%	Retired 2015-2016
1,505	6%	Converted to gas in 2015-2016
2,547	10%	Retired in 2019
9,375	38%	Total coal capacity taken offline 2012-2020
15,030	62%	Coal capacity still online
Duke		
28,415		Total Capacity Online in 2012
4,931	17%	Retired 2012-2014
1,825	6%	Retired 2016-2018
414	1%	Retired 2020
2,704	10%	Sold to Dynegy 2014 (Still Online)
175	1%	Converted to NG 2015
10,048	35%	Total Coal Capacity take offline 2012 -2020
18,367	65%	Coal capacity still online

Source: Company IRP's, EIA 860 2012 and EIA 860m November 2019, supplemented by company websites.

Southern Company²⁶ owned 24,404 MW of coal in 2012 (Table 5). The company retired (and converted to gas) some of its coal capacity, however 62 percent of the coal capacity from 2012 remains online today. The average age of the remaining 15 GW of coal capacity is 41 years. Georgia Power is deferring investment on two coal units at Bowen Power Station and looking for replacement capacity for some time around 2022–2023, but Southern Company has no stated retirement dates for any of its other coal units (Table 6).

²⁶ Excluding Gulf power, which Southern Company sold at the beginning of 2020.

Table 6: Southern Company, Dominion, and Duke’s retirement dates for coal capacity

Stated Retirement Dates	MW	% Company Total Coal
Southern Company		
2022-2023 (maybe)	1,594	11%
No planned retirement	13,435	89%
Dominion Energy		
2021-2023	1,053	17%
No planned retirement	5,024	83%
Duke Energy		
2023-2025	1,448	8%
2026-2029	5,672	31%
Beyond 2030	8,996	49%
No planned retirement date	2,250	12%
Total Company Coal Online	39,475	

Source: Company IRPs, PJM Generator Deactivations.

Virginia Power and Dominion South Carolina (formerly South Carolina Electric and Gas) operated 8,658 MW of coal-fired generating capacity in 2012. Today, 6,079 MW, or two-thirds of that capacity, is still online. Between 2012 and 2020, the company retired only 2,072 MW of coal capacity (with another 507 MW converted to natural gas or biomass). The remaining coal capacity is around 42 years old. Dominion just announced a retirement date for three units in the next few years²⁷ (Table 6). However, Dominion has also made public statements asserting its intention to keep several other coal units online for the foreseeable future.²⁸

Duke Energy owned 28,415 MW of coal-powered generation capacity in 2012. The company retired (and converted to gas) 7,344 MW of its coal capacity and sold another 2,704 MW that is still online. However, 65 percent of its coal capacity from 2012 remains online today. The average age of the remaining 18,367 MW of coal is 43 years. Duke Energy has stated plans to retire around 7,121 MW of coal capacity in the next 10 years (Table 6). However, the company plans to keep the remaining 11,247 MW online for at least the next 10 years, if not longer, and will continue to rely on its coal capacity.

²⁷ PJM Generation Deactivations, available at <https://www.pjm.com/planning/services-requests/gen-deactivations.aspx>.

²⁸ *Dominion Energy: No plans to close Clover Power station in ‘next several years.’* YourGV.com. April 2019. Available at http://www.yourgv.com/business/local_business/dominion-energy-no-plans-to-close-clover-power-station-in/article_1e0a4324-5972-11e9-927a-7fa13fac09e5.html.

THE COMPANIES ARE SPENDING HUNDREDS OF MILLIONS OF DOLLARS OF CUSTOMERS' MONEY TO KEEP AGING COAL PLANTS ONLINE

Keeping gigawatts of aging capacity online requires hundreds of millions of dollars in capital investments both in the form of routine sustaining capital projects and projects to comply with environmental regulation.

Dominion Energy has poured hundreds of millions of dollars into the utility's remaining coal units to keep them in compliance with environmental regulations; however, it is making some progress to retire its coal fleet. In March 2019, it announced its final decisions to permanently shut down 10 of its older gas and coal generating units that had been previously placed into cold storage.²⁹ However, in the same year, Virginia Power requested customers pay over \$300 million to bring the Clover, Chesterfield, and Mt. Storm Plants into compliance with Coal Combustion Residuals (CCR) and Effluent Limitation Guidelines (ELG) (*see text box below*). Of this, \$191 million would have been avoidable if Virginia Power had retired the Chesterfield coal plant. Chesterfield 3 and 4 were both retired in 2019 at 67 and 59 years old. In February 2020, Virginia Power announced it would retire Chesterfield units 5 and 6 on May 31, 2023. The units will be 59 and 54 years old by then.³⁰

²⁹ Walton, Robert. *Dominion makes final decision to close 10 coal and gas-fired units in Virginia*. Utility Dive, March 26, 2019. Available at <https://www.utilitydive.com/news/dominion-makes-final-decision-to-close-10-coal-and-gas-fired-units-in-virgi/551327/>.

³⁰ PJM Generation Deactivations.

Coal Combustion Residuals (CCR) and Effluent Limitations guidelines (ELG) Compliance at Clover, Chesterfield, and Mt. Storm

Virginia Case No. PUR-2018-00195

In 2018, Virginia Power requested approval from the Virginia State Corporation Commission (SCC) to recover \$302.4 million in costs incurred to comply with state and environmental rules at three of the company's coal-fired power plants³¹ (Chesterfield, Clover, and Mt. Storm Power).³² Of this, \$191 million would have been avoidable if Chesterfield had been retired.

The company began the Chesterfield project (in June of 2015) with the knowledge that the economic performance of its existing coal plants was in decline due to falling gas and renewable prices, more stringent environmental regulations, and falling load. With this level of uncertainty, there was value to customers in deferring the decision.³³

The company relied on outdated analysis from 2011 and did not conduct new, robust economic analysis comparing the costs of the environmental projects with alternative options, including retirement and replacement. The analysis the company purported to rely on was provided to intervenors confidentially and was not available to the public for any level of review. Further, the analysis provided contained no inputs or assumptions to show how the utility calculated the results.³⁴ In its 2015 IRP, published on July 1, 2015, the company stated that because of future uncertainty around the Clean Power Plan (CPP), the company was not making any long-term recommendations.³⁵ This statement was made one month after signing the contract to begin the \$125 million wet-to-dry scrubber at Chesterfield.

The SCC (followed by the North Carolina Commission) disallowed recovery of only the most egregiously incurred expenses: \$18 million spent on a wet-to-dry scrubber at Chesterfield 3 Unit.³⁶ The unit was offline at the time, and there was clear evidence that the company knew the unit was uneconomic at the time of the investment. In addition, the unit had never been run after the scrubber was installed. The remainder of the project costs were passed on to Virginia and North Carolina customers. This \$18 million disallowance by the Commission is one of the first examples of a Commission disallowing recovery of costs incurred at an uneconomic coal plant on the basis that the investment was imprudently made.

In a 2018 publication, Southern Company stated that the company had no intention of investing in the existing thermal coal fleet unless that investment “ensures safety, affordability or reliability to serve

³¹ Specifically, a rate adjustment clause for a rider to cover the costs of capital upgrades made to comply with coal combustion residuals and effluent limitation guidelines.

³² Application of Virginia Electric and Power Company in *Virginia Case No. PUR-2018-00195*, filed December 12, 2019. Available at <http://www.scc.virginia.gov/docketsearch/DOCS/4dbh01!.PDF>.

³³ Direct Testimony of Devi Glick, *Virginia Case No. PUR-2018-00195*. April 23, 2019. Available at <http://www.scc.virginia.gov/docketsearch/DOCS/4g2%2401!.PDF>.

customers or to comply with federal or state laws.”³⁷ This goal has no actual metrics associated with it, making it difficult to measure if the company is compliant. In fact, the company has continued to invest hundreds of millions of dollars into its coal plants with limited transparency and scrutiny around its decisions. The company spent billions of dollars on a “clean coal” plant in Mississippi, the Kemper County Energy Facility, that was ultimately abandoned due to construction delays and cost overruns estimated at \$4.6 billion.³⁸ At Plant Daniel, owned jointly by Mississippi Power and Gulf Power, the company invested \$313 million in 2012 to add sulfur dioxide scrubbers and \$125 million in 2019 to comply with CCR regulations (see the text box below). The entire scrubber investment, and \$23.85 million of the CCR compliance project would have been avoided if the company had retired the plant prior to making the investments.

³⁴ Final Order of the Virginia State Corporation Commission in *Virginia Case No. PUR-2018-00195*. August 5, 2019 at page 8. Available at <http://www.scc.virginia.gov/docketsearch/DOCS/4%243v01!.PDF>.

³⁵ Dominion 2015 IRP, July 1, 2015, page 5. Case No. PUE-2015-00035, available at <http://www.scc.virginia.gov/docketsearch#caseDocs/134454>.

³⁶ Final Order of the Virginia State Corporation Commission in *Virginia Case No. PUR-2018-00195*. August 5, 2019 at page 9.

³⁷ Southern Company. *Planning for a Low-Carbon Future*. April 2018. Available at: <https://www.southerncompany.com/content/dam/southern-company/pdf/corpresponsibility/Planning-for-a-low-carbon-future.pdf>.

³⁸ Walton, Robert. *DOJ opens investigation into Kemper plant as Southern warns of possible ‘material impact’*. Utility Dive. May 2, 2019. Available at: <https://www.utilitydive.com/news/doj-opens-investigation-into-kemper-plant-as-southern-warns-of-possible-ma/553936/>.

Coal Combustion Residual Compliance at Plant Daniel

Mississippi Docket No. 19-UA-116

In July 2019, Southern Company subsidiary Mississippi Power submitted an application to the Mississippi Public Service Commission for a Certificate of Public Convenience and Necessity (CPCN) to spend \$125 million at Plant Daniel to comply with federal CCR regulations.³⁹ The application was supported by only 17 pages of testimony and exhibits, and it contained no analysis or modeling supporting the decision to invest in the plant.

Plant Daniel had been operating at a significant loss for at least three years, and it was projected to continue losing customers considerable sums of money going forward (the details of these findings are confidential).⁴⁰ Mississippi Power had delayed seeking approval for the project by more than a year,⁴¹ and then asked the Commission to fast-track approval based on the claim that the system would face reliability issues if the project was delayed. The company provided no analysis to support this claim, however. We noted in our findings that Mississippi Power could save customers money by committing to retire Plant Daniel by 2023, thereby getting an extension on CCR waste disposal and leaving sufficient time to address the purported reliability issues in the interim.

Mississippi Power persuaded the Commission that reliability concerns required the utility to keep Plant Daniel online, and thus the CCR project was required. The Company also argued that the CPCN docket was not an appropriate forum to consider plant economics, and issue was moved to Mississippi Power's Reserve Margin docket at the Commission. Mississippi Power has begun construction of the CCR project.

In Duke Indiana's 2019 rate case, the company requested over \$100 million in capital investments at three of its coal plants for the year 2020: \$51 million at the Edwardsport Generating Station, \$11.5 million at the Cayuga Generating Station, and \$40.5 million at Gibson Generating Station.⁴² All \$103 million would have been avoidable if the plants were retired.

³⁹ Petition of Mississippi Power Company for a Certificate of Public Convenience and Necessity, *Mississippi Public Service Commission Docket No. 19-UA-116*, filed July 9, 2019. Available at https://www.psc.state.ms.us/InSiteConnect/InSiteView.aspx?model=INSITE_CONNECT&queue=CTS_ARCHIVEQ&docid=639521.

⁴⁰ Direct Testimony of Rachel Wilson, *Mississippi Public Service Commission Docket No. 19-UA-116*, filed October 16, 2019. Available at https://www.psc.state.ms.us/InSiteConnect/InSiteView.aspx?model=INSITE_CONNECT&queue=CTS_ARCHIVEQ&docid=644221.

⁴¹ The EPA finalized the compliance deadline in June 2018. Mississippi Power didn't file its application for the CCR project until July of 2019, nearly a year after. At this time, Mississippi Power claimed that in order to meet the October 1, 2020 deadline, the company would need to begin construction on the CCR project by November 1, 2019 and therefore required urgent and immediate approval.

⁴² Direct testimony of Tyler Comings, Indiana Utility Regulatory Commission, Cause No. 45253. October 30, 2019. Available at https://iurc.portal.in.gov/_entity/sharepointdocumentlocation/038a6001-ebfb-e911-a997-001dd800951b/bb9c6bba-fd52-45ad-8e64-a444aef13c39?file=45253%20Public%20Redacted%20Comings%20Direct%20Testimony%20with%20Exhibits%2010%2030%202019.pdf&folderPath=.

THE COMPANIES ARE OPERATING THEIR COAL FLEETS UNECONOMICALLY, COSTING CUSTOMERS MONEY

Customers are responsible for the operational and fuel costs stemming from the utilities' uneconomic dispatch practices. In organized wholesale markets, uneconomic dispatch results from a practice called "self-commitment" used by utilities to dispatch their coal plants in the market even when the utility could procure electricity from the market at a lower cost (see the text box below). In bilateral markets, such as exists in the Southern Company territory and certain of Duke Energy's territories, this simply means operating their coal units when they could procure the energy from other units or other Southern Company utilities at a lower cost. In either case, the costs associated with this uneconomic behavior are being passed onto customers through higher fuel and operational costs than the utilities would incur if they instead were dispatching coal units only when it was economic to do so.

These issues have been widely discussed in the Southwest Power Pool (SPP) and Midcontinent Independent System Operator (MISO) markets.⁴³ The SPP market monitor issued a report looking into the topic of uneconomic self-commitment in December of last year,⁴⁴ and the Minnesota and Missouri commissions both recently opened dockets to explore how self-commitment and uneconomic dispatch affect the power markets.⁴⁵

⁴³ Fisher, Jeremy, Al Armendariz, Matthew Miller, Brendan Pierpont, Casey Roberts, Josh Smith, Greg Wannier. *Playing With Other People's Money: How Non-Economic Coal Operations Distort Energy Markets* Sierra Club, 2019. Available at <https://www.sierraclub.org/sites/www.sierraclub.org/files/Other%20Peoples%20Money%20Non-Economic%20Dispatch%20Paper%20Oct%202019.pdf>.

⁴⁴ SPP Market Monitoring Unit, *Self-committing in SPP markets: Overview, impacts and recommendations*. December 2019. Available at <https://spp.org/documents/61118/spp%20mmu%20self-commit%20whitepaper.pdf>.

⁴⁵ Missouri Public Service Commission, Docket No. EW-2019-0370; Minnesota Public Utility Commission Dockets Nos. E999/AA-17-492 and E999/AA-18-373.



Uneconomic Plant Dispatch at Duke Indiana's Coal Plants

Indiana Utility Regulatory Commission Cause No. 45253 (and upcoming Fuel Cost Adjustment Dockets)

Duke Indiana regularly operates its coal plants in “self-commit” mode, meaning that the company dispatches them into the market regardless of whether it is economic to do so. This means the utility operates its coal units at a loss to customers even when it could procure electricity from the market at a lower cost.

An expert for Sierra Club reviewed the company's plant dispatch practices and found the company's operation of its coal units to be imprudent. The exact details of the plant operation and losses are confidential, but the expert found that the company “self-committed” the plants into the MISO market in every hour the plants were available. This led to long periods of uneconomic operation and significant losses for the company. This behavior was most extreme at the Edwardsport plant but was also observed at the Cayuga and Gibson plants.⁴⁶

THE COMPANIES' COAL FLEETS WILL CONTINUE TO COST BILLIONS OF DOLLARS LONG AFTER THE PLANTS RETIRE, PUTTING CUSTOMERS AND/OR INVESTORS AT RISK

In addition to sustaining capital and operational costs, customers and/or investors face a legacy of billions of dollars in coal ash clean-up costs (to ensure the coal ash waste sitting in existing ponds and pits does not spill over or leak into the groundwater) long after the plants are retired. Duke's estimated cleanup costs in North Carolina alone will exceed \$9 billion.^{47,48} Duke has begun framing the impending coal ash clean-up projects (which will be going on over the next 10 to 15 years)⁴⁹ as a shared responsibility.⁵⁰ The company will seek to recover cleanup costs from customers over the future decades. Dominion also has to excavate a large amount of coal ash waste in Virginia.⁵¹ It remains to be seen whether the state utility commission will allow Dominion to pass the costs onto customers, or

⁴⁶ Direct testimony of Tyler Comings, Indiana Utility Regulatory Commission, Cause No. 45253. October 30, 2019.

⁴⁷ Morehouse, Catherine. “Duke agrees to largest coal ash cleanup in US after year of fighting with environmentalists,” *Utility Dive*. January 2020. Available at <https://www.utilitydive.com/news/duke-agrees-to-largest-coal-ash-clean-up-in-us-after-years-of-fighting-with/569699/>; and Taris, Josie and Frank Stasio. Duke Energy and NC reach a settlement over nearly 80 Million Tons of Coal Ash. North Carolina Public Radio, January 7, 2020. Available at <https://www.wunc.org/post/duke-energy-and-nc-reach-settlement-over-nearly-80-million-tons-coal-ash>.

⁴⁸ The Company fought the North Carolina Department of Environmental Quality (DEQ) and the Southern Environmental Law Center on cleanup requirements, but ultimately settled the case and agreed to excavate its North Carolina sites (rather than capping them in place).

⁴⁹ Morehouse, Catherine. “Duke agrees to largest coal ash cleanup in US after year of fighting with environmentalists,” *Utility Dive*. January 2020.

⁵⁰ Duke website: Coal Ash: A Shared responsibility. 2018 Duke Energy Corporation 183066 11/17.

⁵¹ Morehouse, Catherine. “Coal ash, Atlantic Coast Pipeline remain a headache for Duke as it expands 5 year spending by \$6B.” *Utility Dive*, February 2020. Available at <https://www.utilitydive.com/news/coal-ash-atlantic-coast-pipeline-remain-a-headache-for-duke-as-it-expands/572314/>.

alternatively if North Carolina passes state legislation that blocks or limits the cleanup costs and associated return that Duke can recover from customers.⁵² Shareholders will bear the brunt of any costs not passed through to customers.

The companies are framing these cleanup projects and costs as one-time expenditures. However, to the extent companies continue to operate coal plants and generate additional waste, and therefore the risks grow that something will break, spill, or exceed available space, the liabilities to customers and investors also continue to grow.

4.3. THE COMPANIES ARE UNDULY FOCUSED ON TRADITIONAL FOSSIL GENERATION TO REPLACE THE COAL ASSETS THEY ARE RETIRING

Southern Company, Dominion Energy, and Duke Energy have pivoted heavily towards gas in three ways: (1) to replace the coal (and other aging steam) capacity the company is retiring; (2) to meet projected future load growth; and (3) by proposing the Atlantic Coast Pipeline (ACP) to supply gas to many of its generators. The companies' status quo resource planning approach causes this by (1) focusing on replacing the resource being retired (rather than what the system needs) and; (2) evaluating alternative resources in ways that systematically disadvantages alternatives relative to traditional fossil resources as would occur under more robust and appropriate planning processes.

THE THREE COMPANIES HAVE REPLACED OVER SEVENTY PERCENT OF ALL RETIRED COAL CAPACITY WITH NEW GAS CAPACITY SINCE 2012

Combined, Southern Company, Dominion Energy, and Duke Energy have built (or converted) a total of 14 GW of new gas generation since 2012, with Southern Company adding 3.4 GW of new gas capacity, Dominion adding 5 GW, and Duke adding 5.5 GW (Table 7). Over this same time period, the three companies retired 19,298 MW of coal capacity or converted it to gas or biomass. The retirement of 19 GW of coal capacity is a good thing from a decarbonization perspective. However, it is extremely concerning that the vast majority (72 percent) of the retired coal capacity was replaced by carbon-emitting gas capacity. This means that on net the three companies retired only 5.4 GW of fossil generation (representing less than four percent of these companies' combined generation fleets of around 125 MW of capacity). This heavy investment in gas units locks the three companies into carbon-intensive resource portfolios for the next several decades and does not put them on a path to decarbonization.

While gas-fired power plants (combined cycle units especially) have much lower CO₂ emission directly from the smokestack than coal plants, gas plants are by no measure a "clean" alternative. The plants still

⁵² Morehouse, Catherine. "No chance' on making Duke absorb coal ash costs, North Carolina GOP says." *Utility Dive*, April 9, 2019. Available at <https://www.utilitydive.com/news/no-chance-north-carolina-gop-says-on-making-duke-absorb-coal-ash-costs/552326/>.

emit a substantial amount of CO₂ and there is significant uncertainty⁵³ around the level of upstream methane leakage that results from the process of extracting and transporting natural gas. However, while the magnitude of leakage is uncertain, there is little debate that leakage is happening. A commitment to decarbonization requires that the three companies explore ways to quantify these impacts and incorporate them into their analyses

Table 7: New gas capacity brought online since 2012

Company	MW	Year Online
Dominion		
Warren County	1,472	2014
Brunswick County Power Station	1,472	2016
Greenville County Power Station	1,773	2018
McMeekin*	294	2018
Dominion Total	5,011	
Duke		
Dan River	698	2012
Lee Combined Cycle Plant	920	2012
L V Sutton Combined Cycle	730	2013
L V Sutton Combined Cycle	121	2017
Crystal River	1,971	2018
W S Lee*	1,010	2018
Duke Energy CHP at Clemson University	13	2019
Duke Total	5,463	
Southern Company		
Jack McDonough*	2,604	2012
Ratcliffe	840	2014
Southern Company Total	3,444	
Total New Gas	13,918	

Source: EIA form 860 supplemented by plant information on utility websites.

*Includes units converted from coal to gas.

THE COMPANIES PLAN TO CONTINUE BUILDING A LARGE AMOUNT OF NEW GAS CAPACITY OVER THE NEXT TWO DECADES

The three companies plan to add over 22 GW of new natural gas combined cycle (CC) and combustion turbine (CT) units over the next 10 to 20 years, according to their IRPs and Ten-Year Site Plans (Table 8).

⁵³ A study published in the journal *Science* in July of 2018 found the methane leakage rates are likely double what the EPA estimates, and many scientists feel that the *Science* study still significantly underestimates leakage rates. Marhese, Anthony and Dan Zimmerle. *The U.S. natural gas industry is leaking way more methane than previously thought*. PBS News Hour, July 4, 2018. Available at <https://www.pbs.org/newshour/science/the-u-s-natural-gas-industry-is-leaking-way-more-methane-than-previously-thought>.

That represents nearly a third more gas capacity coming online than coal capacity being retired over the next 20 years (17 GW of coal capacity has a planned retirement date before 2040) based on current utility retirement plans and is equivalent to a little over half the 39 GW of coal capacity still online today.

Table 8: New gas capacity planned according to IRPs and resource planning documents

Company	MW	Resource Details
Southern Company*	2,400	CC's and CT's 2023 - 2028
Duke Energy*	14,988	CC's and CT's 2020 - 2034
Dominion	4,286	CC's and CT's 2022 - 2040
Total Planned New Gas	21,674	

Source: Utility IRPs and Ten-Year Site Plans

Note: Mississippi Power and Duke Energy Ohio do not have resource plans, so it is not clear if these utilities plan to build any new gas capacity in the next two decades.

Gas analysis is complicated by the fact that not all utilities are transparent about their future resource plans, and even those that have resource plans do not appear to accurately capture all the new planned gas additions. Alabama Power, for example, filed an application in September to build a new gas plant and acquire another existing plant (*details in the text box below*). This new plant construction and plant acquisition results in much more new gas capacity than Alabama Power itself projected in its 2019 IRP.⁵⁴

⁵⁴ An IRP is a non-binding long-term resource plan, while a CPCN is an application for approval to build a specific plant.

Alabama Power Certificate of Public Convenience and Necessity for New Gas Capacity

Alabama Public Service Commission Docket No. 32953

Alabama Power submitted a CPCN in September 2019 for 1,896 MW of new or existing gas resources, including a new 743 MW combined cycle unit, an existing 915 MW combined cycle unit built in 2003, and a 238 MW power purchase agreement (PPA) with another existing combined cycle unit.⁵⁵

Alabama Power points to a projected winter capacity deficit as the driver for these projects; however, Synapse found that the proposed gas units are a mismatch for Alabama Power's projected need. The winter peak begins to decline after reaching a high in 2023–2024. The utility has not shown that it cannot rely in part on capacity from the Southern Power Pool and additional renewables-plus-storage projects to meet incremental need.

Synapse found that Alabama Power did not demonstrate that the addition of these gas units was the least-cost resource portfolio. Additionally, there are a number of risks associated with these units, as gas units face the risk of fuel price volatility and fuel supply disruption, particularly in the winter. Alabama Power's projected need is, in part, a result of the company's current reliance on gas, and to meet that need with more gas is illogical. In addition, downward pressure on the prices of renewable technologies leads to substantial stranded asset risk for gas generators, particularly new units with longer expected service lives. These units also face the risk of CO₂ regulation, which would result in increased operating costs that are passed on to customers.

⁵⁵ Alabama Power Petition for Certification of Convenience and Necessity, Alabama Public Service Commission. Docket No. 32953. September 2019. Available at <https://www.pscpublicaccess.alabama.gov/pscpublicaccess/page/docket-docs/PSC/DocketDetails.aspx>

Virginia Electric and Power Company's 2018 IRP

Virginia State Corporation Commission Case No. PUR-2019-00141

In a first for the state and for the utility, Virginia's State Corporation Commission (SCC) rejected Dominion's 2018 IRP. The SCC said that Dominion's long-term peak and annual energy demand were too high and pointed to PJM's 2018 load projection of 0.8 percent for the Dominion Zone, compared to Dominion's forecast of 1.4 percent. Regulators also noted that Dominion had failed to model a number of resources mandated by Senate Bill 966, the Grid Transformation and Security Act, including \$870 million in energy efficiency investment and a battery storage pilot project. Synapse noted that Dominion also failed to model battery storage resources as a selectable resource in its portfolio optimization modeling. Dominion's updated IRP included fewer combustion turbines but also, substantially less utility-scale solar PV in its base scenario.⁵⁶

Duke Energy also continues to rely on gas across its subsidiary utilities. Since 2012, the company has added 5,463 MW of new gas capacity, and according to the utility IRPs, the company plans to add another nearly 15 GW of new gas capacity in the next few decades. The company relies on its gas capacity to supply a considerable portion of its energy needs. For example, in 2019, over 75 percent of the energy generated in Duke Energy Florida's territory came from gas.

HOW TO RECONCILE NET-ZERO 2050 WITH A FOSSIL-FUEL PIPELINE PROJECTED TO LAST UNTIL 2100?

Duke and Dominion⁵⁷ jointly own the proposed Atlantic Coast Pipeline (ACP), a 600-mile pipeline that will run through West Virginia, Virginia, and North Carolina and is projected to cost over \$8 billion⁵⁸ (Duke owns 47 percent⁵⁹ and Dominion owns 53 percent after just recently buying back Southern Company's 5 percent share).⁶⁰ Despite the cost overruns and legal setbacks, Dominion continues to be

⁵⁶ Virginia Electric and Power Company's 2019 Update to 2018 Integrated Resource Plan, Virginia State Corporation Commission and North Carolina Utilities Commission. Case No. PUR-2019-00141, Docket No. E-100, Sub 157.

⁵⁷ Southern Company was an equity partner in the project; however on February 11, 2020, Dominion announced its intention to buy Southern Company's 5 percent stake in the project.

⁵⁸ Weber, Harry. Dominion agrees to buy Southern stake in Atlantic Coast Pipeline as project costs soar, S&P Global Platts. February 11, 2020. Available at <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/021120-dominion-agrees-to-buy-southern-stake-in-atlantic-coast-pipeline-as-project-costs-soar>.

⁵⁹ Kunkel, Cathy. *The Vanishing Need for the Atlantic Coast Pipeline*. Institute for Energy Economics and Financial Analysis (IEEFA). January 2019. Available at: https://ieefa.org/wp-content/uploads/2019/01/Atlantic-Coast-Pipeline_January-2019.pdf

⁶⁰ Weber, Harry. *Dominion agrees to buy Southern stake in Atlantic Coast Pipeline as project costs soar*, S&P Global. February, 2020.



committed to the 2021 completion of the ACP.⁶¹ Dominion claims the ACP is an investment in both lower cost fuels and an investment in the local economy, which will create 17,240 jobs during construction. Those jobs are ultimately temporary, however, and are not an investment in the long-term growth of the local economy. Duke is marketing the ACP as “critical infrastructure that will allow [Duke Energy] to bring low cost gas supply and economic development to the Southeast.”⁶²

While the ACP is not directly owned by the subsidiary electric utilities discussed here, those subsidiary utilities have contracted for the majority of the gas that will be transported on the pipeline.⁶³ This means that the costs associated with building the pipeline will be passed onto the utility customers via transportation fees and fuel contracts. The ACP is projected to supply up to 1.5 billion cubic feet of gas per day, equivalent to 67 million metric tons of CO₂ emissions per year, not accounting for emissions associated with leaks.⁶⁴ It seems unlikely that ownership of the gas transportation network has no influence on these companies’ decisions to build and rely on generators that would be in part be supplied by the pipeline. Additionally, the pipeline has a projected lifetime of 80 years. Which begs the question, how can Duke and Dominion be net or zero carbon by 2050 if they are building a pipeline intended to supply its own generators with natural gas that has a lifetime through 2100?⁶⁵

4.4. THE COMPANIES ARE UNDERUTILIZING AND UNDERINVESTING IN RENEWABLES AND DISTRIBUTED ALTERNATIVES

Southern Company, Dominion, and Duke have been slow to embrace renewables and demand-side management (DSM) as an integral and fundamental part of their resource plans and energy futures.

⁶¹ Young, Charles. *Dominion official: Company remains committed to ACP, construction expected to be complete in 2021*. West Virginia News. November 10, 2019. Available at: https://www.wvnews.com/news/wvnews/dominion-official-company-remains-committed-to-acp-construction-expected-to/article_004b0463-efb4-5a4a-b29b-aed25478a3e8.html.

⁶² Duke Energy. *Annual Report*. 2018. Available at: <https://www.duke-energy.com/annual-report>.

⁶³ Kunkel, Cathy. *The Vanishing Need for the Atlantic Coast Pipeline*. Institute for Energy Economics and Financial Analysis (IEEFA). January 2019. Available at: https://ieefa.org/wp-content/uploads/2019/01/Atlantic-Coast-Pipeline_January-2019.pdf.

⁶⁴ Oil Change International. *Risk Upon Risk: Threats to the ACP go well beyond Forest Service Permits*. March 2019. Available at: <http://priceofoil.org/content/uploads/2019/03/ACP-Risk-Upon-Risk.pdf>.

⁶⁵ Path of the Pipeline Webpage, Southern Environmental Law Center. <https://www.southernenvironment.org/inthepath/>.

THE THREE COMPANIES HAVE UNDERINVESTED IN ENERGY EFFICIENCY

Energy efficiency investment in the Southeast, where Southern Company, Dominion Energy, and Duke Energy are predominantly located, has significantly lagged the national average.^{66,67} Energy efficiency is generally the least-cost energy resource available to a utility, and therefore it is foundational to any utility's decarbonization efforts. However, the three companies are doing little to capture the value for customers that energy efficiency and other DSM programs can provide.⁶⁸ Further, most of the efficiency investment these companies have made are focused on summer energy savings. This made sense historically, as utilities in the Southeast had their system peaks in the summer. However,, these utilities are increasingly characterizing their systems as dual or winter peaking. In this context, the three companies' failure to invest in winter DSM has created an environment in which solar PV does not contribute to the system peak. (*See the text box below.*)

Dominion South Carolina (SCE&G) Winter DSM Investment

South Carolina Public Utility Commission Docket 2018-2-E

Every year, Duke and Dominion's utilities in South Carolina seek approval from the South Carolina Public Utility Commission for the utilities' avoided cost rates (set according to the Public Utilities Regulatory Policies Act or PURPA, which was passed in the 1970's as a way to encourage energy conservation and promote greater use of domestic energy and renewable energy). These rates set the energy and capacity value paid to qualifying facilities under a size cap, generally 10 MW or 1 MW, which means that they set the price paid to small residential and commercial-scale solar arrays not owned by the utility.

In 2018, for the first time, SCE&G claimed that its system was winter peaking, that solar provides no winter peak capacity, and therefore that the avoided capacity value for solar is zero dollars. This assertion was supported by the company's modeling of its system and future resource needs, however, which included almost no winter DSM. We found that with only a small amount of winter DSM, the company's system would actually not be winter peaking anymore, and solar would be able to contribute firm capacity to meet system peak.

The company's move to eliminate an avoided capacity value drastically cut the compensation available to solar qualifying facilities on its system. The Commission allowed SCE&G to use a zero dollar avoided capacity value for the following year; however, it also responded to our recommendation in its order and directed SCE&G to evaluate winter DSM and energy efficiency measures "targeted at reducing load during winter peak, such that the utility would be positioned to avoid capacity cost with solar generation."⁶⁹

In 2015, Virginia Power ranked second to last for energy efficiency programs and policy among the 51 largest U.S. utilities in ACEEE's utility ranking report.^{70,71} The company has made little improvement over

⁶⁶ Southern Alliance for Clean Energy (2018). Energy Efficiency in the Southeast, 2018 Annual Report. Available at <https://cleanenergy.org/wp-content/uploads/2018-Energy-Efficiency-in-the-Southeast-SACE-2.pdf>.

the following three years, and in 2018 ranked 50 out of the 52 utilities reviewed in that year's report.⁷² Virginia Power is required to spend \$870 million on efficiency programs between 2018 and 2027 per a 2018 Virginia energy law. However, according to experts at ACEEE, the company is only on track to spend 40 percent of that amount.⁷³ South Carolina Electric and Gas (now Dominion South Carolina) just missed the bottom 10 rankings in the 2015 ACEEE utility ranking report,⁷⁴ and it slid even further down into the bottom 10 in 2018.⁷⁵ Figure 9 shows ACEEE rankings for 2018 for all utilities, and Table 9 below shows how the utility rankings translate into the metric of net savings from energy efficiency as a percentage of retail sales.

⁶⁷ Relf, Grace, Brendon Baaz, and Seth Nowak. *2017 Utility Energy Efficiency Scorecard*. American Council for an Energy-Efficient Economy. June 2017. Available at <https://www.aceee.org/research-report/u1707>.

⁶⁸ Demand-side management (DSM) programs consist of the planning, implementing, and monitoring activities of electric utilities which are designed to encourage consumers to modify their level and pattern of electricity usage.

⁶⁹ Commission Directive, Public Service Commission of South Carolina, April 25, 2018. Docket No. 2018-2-E. Available at <https://dms.psc.sc.gov/Attachments/Matter/fa1ee229-fb09-4720-aaa3-a567c00d10ed>.

⁷⁰ Relf, Grace, Brendon Baaz, and Seth Nowak. *2017 Utility Energy Efficiency Scorecard*. American Council for an Energy-Efficient Economy. June 2017.

⁷¹ ACEEE's 2017 Utility Energy Efficiency Scorecard evaluates utility performance in 2015, and their 2020 Scorecard evaluates utility performance in 2018.

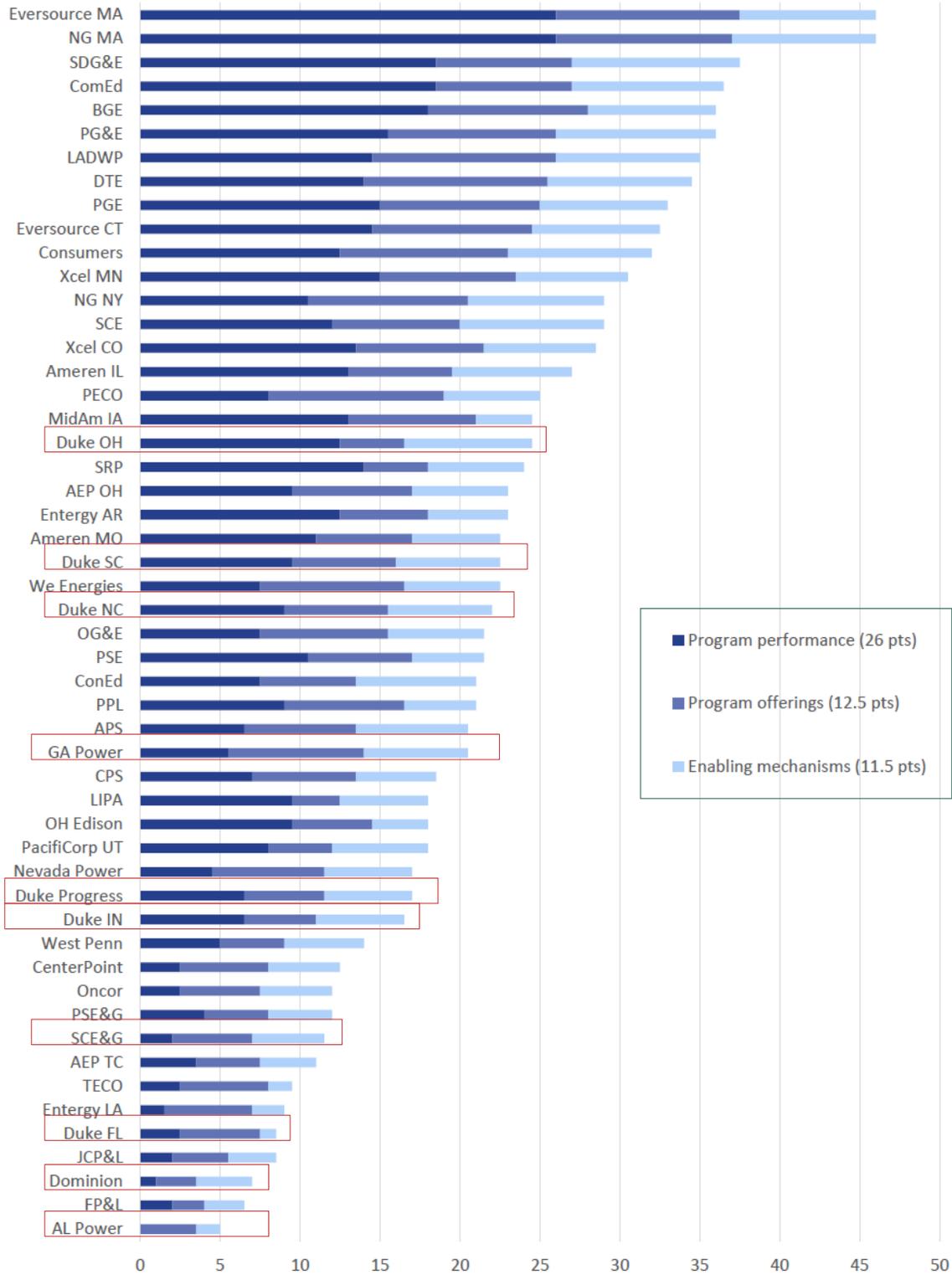
⁷² Relf, Grace, Emma Cooper, Rachel Gold, Akanksha Goyal, and Corri Waters. *2020 Utility Energy Efficiency Scorecard*. American Council or an Energy-Efficient Economy. February 2020. Available at <https://www.aceee.org/research-report/u2004>.

⁷³ McGowan, Elizabeth. *Dominion needs to ramp up efficiency programs to hit mandate, advocates say*. Energy Efficiency Network. May 2019. Available at <https://energynews.us/2019/05/24/us/dominion-needs-to-ramp-up-efficiency-programs-to-hit-mandate-advocates-say/>.

⁷⁴ Relf, Grace, Brendon Baaz, and Seth Nowak. *2017 Utility Energy Efficiency Scorecard*. American Council for an Energy-Efficient Economy. June 2017.

⁷⁵ Relf, Grace, Emma Cooper, Rachel Gold, Akanksha Goyal, and Corri Waters. *2020 Utility Energy Efficiency Scorecard*. American Council or an Energy-Efficient Economy. February 2020.

Figure 9: ACEEE utility energy efficiency rankings (2018)



Source: ACEEE 2020 Utility Energy Efficiency Scorecard, Figure 2.



Table 9: Net savings as a percentage of total sales in 2018

Utility	Savings as a % of Sales (2018)
Leading U.S. Utility (National Grid MA)*	3.73%
Average U.S. Savings from energy efficiency*	1.00%
Southern Company	
Georgia Power	0.46%
Alabama Power	0.03%
Mississippi Power	0.19%
Dominion	
Dominion South Carolina	0.31%
Dominion Virginia	0.11%
Duke Energy	
Duke Kentucky	0.45%
Duke Carolinas	1.33%
Duke Progress	0.91%
Duke Indiana	0.80%
Duke Florida	0.20%

Source: EIA f861, 2018 Sales and EE tables, *ACEEE 2020 Utility Energy Efficiency Scorecard.

Southern Company utilities Georgia Power and Alabama Power were ranked in the bottom 10 in 2015 by ACEEE’s utility ranking scorecard⁷⁶ (Mississippi Power was not included in the report due to its small size). Alabama Power came in dead last with virtually no utility spending on energy efficiency programs in both 2015 and 2018;⁷⁷ however Georgia Power did show some improvement and sits closer to the middle of the pack in the 2018 rankings.⁷⁸ In 2019, the Georgia Commission ordered Georgia Power (as part of the company’s 2019 IRP Order) to increase energy efficiency savings targets by 15 percent and spending by 10 percent over what the utility had proposed.⁷⁹

Duke Indiana and Duke Florida both were ranked in the bottom 10 by ACEEE utility rankings in 2015, while Duke Energy Carolinas, Duke Energy Progress, and Duke Energy Ohio all ranked in the middle to bottom third among the 51 utilities evaluated.⁸⁰ In 2018, Duke Florida, Duke Indiana, and Duke Progress

⁷⁶ Relf, Grace, Brendon Baaz, and Seth Nowak. 2017 Utility Energy Efficiency Scorecard. American Council for an Energy-Efficient Economy. June 2017.

⁷⁷ *Ibid*; and Relf, Grace, Emma Cooper, Rachel Gold, Akanksha Goyal, and Corri Waters. 2020 Utility Energy Efficiency Scorecard. American Council or an Energy-Efficient Economy. February 2020.

⁷⁸ *Ibid*.

⁷⁹ Order Adopting Stipulation as Amended, Georgia Public Service Commission. July 29, 2019, Docket Nos 42310 and 42311.

⁸⁰ Relf, Grace, Brendon Baaz, and Seth Nowak. 2017 Utility Energy Efficiency Scorecard. American Council for an Energy-Efficient Economy. June 2017.

still ranked near the bottom, while Duke Carolinas and Duke Ohio ranked solidly near the middle.⁸¹ For Duke, the strategy of sitting in the middle of the pack and investing to levels needed to comply with state mandates is not a good strategy for achieving net-zero status.

THE COMPANIES ARE NOT RAMPING UP INVESTMENT IN RENEWABLES FAST ENOUGH

Utility investment in renewables and battery storage has lagged significantly among these three companies. While each has made some incremental investments, we found that by and large they are doing the minimum required to meet state RPS requirements, regulations, and commission orders.

Table 10: Current and planned renewable additions by company

	Utility-Scale Solar		Wind		Energy Storage*	
	Online	Planned	Online	Planned	Online	Planned
Southern Company	2,277	2,440	-	-	-	-
Mississippi Power	159	0				
Alabama Power	18	340				
Georgia Power	2,100	2,100				
Duke Energy	3,846	7,798	100	600	-	604
Duke Energy Carolina	789	2,962				342
Duke Energy Progress	2,801	1,828				238
Duke Energy Florida	213	1,328				
Duke Energy Indiana	41	1,631	100	600	10	5
Duke Energy Ohio (Kentucky)	2	49			1.6	19
Dominion	880	3,889	12	2,652	-	-
Dominion South Carolina	64	289				
Virginia Electric and Power Company	816	3,600	12	3,052		
Total	7,003	14,127	112	3,652	-	604

Source: Company IRPs supplemented by other public information. Virginia Power Solar and Wind includes renewable additions required under the Grid Transformation and Security Action

*Excludes pumped hydro.

SOUTHERN COMPANY

Georgia Power has been adding solar to its system at the order of the Georgia Public Service Commission since 2013 when the Commission directed the utility to build 525 MW of solar (as part of the 2013 IRP process). In 2016, the utility was ordered to build another 1,600 MW after initially

⁸¹ Relf, Grace, Emma Cooper, Rachel Gold, Akanksha Goyal, and Corri Waters. 2020 Utility Energy Efficiency Scorecard. American Council on an Energy-Efficient Economy. February 2020.

proposing only 525 MW,⁸² and in 2019 it was ordered to add another 2,100 MW of renewables (mostly solar) by 2024 and 80 MW of battery storage after initially proposing only 1,000 MW of solar in its IRP.⁸³ With around 1,800 MW of renewables (mostly solar) online in 2019 (there should be around 2,100 MW online as of the end of 2019),⁸⁴ and another 2,100 MW planned in the next few years, Georgia Power is certainly making some progress to add renewables. However, it is concerning that most of this capacity was added only once the Commission stepped in and ordered the utility to do so.

Alabama is only one of three states in the country that does not have a net metering policy.⁸⁵ Therefore, it is not surprising that Alabama Power Company has only 2.4 MW of distributed solar on its system (as of the end of 2018). The company owns only 18 MW of utility-scale solar.⁸⁶ Alabama Power recently announced plans to add 340 MW of solar to its system; however, this announcement came in the same application as a proposal to build and acquire over 1,600 MW of natural gas combined cycle capacity (in 2023).⁸⁷ The utility included plans for an additional 800 MW of gas capacity between now and 2030. It is hard to see how a utility adding 7 MW of gas capacity for every 1 MW of new solar capacity is on the path to decarbonization.

Mississippi Power Company has not historically been required to file IRPs or public resource plans; therefore, its future build plans are unclear. However, the Commission passed a rule in December 2019 requiring Mississippi Power to file an IRP for the first time, with a deadline of November 2020.⁸⁸ The utility appears to have only 157 MW of utility-scale solar installed on its system across three different

⁸² Georgia Power Company's 2016 Integrated Resource Plan, Georgia Public Service Commission, Docket No. 40161. January 29, 2016. Available at http://mediad.publicbroadcasting.net/p/wabe/files/201602/2016_irp_main_doc__pdf_.pdf.

⁸³ Georgia Public Service Commission, Media Advisory. *Commission Adds 2,210 MW of Renewable Energy in Georgia Power 2019 Integrated Resource Plan*. Available at https://psc.ga.gov/site/assets/files/4279/media_advisory_for_7-16-19_gpc_irp_for_web.pdf.

⁸⁴ Georgia Power 2019 Integrated Resource Plan, Georgia Public Service Commission, Docket No. 42310.

⁸⁵ Foehringer Merchant, Emma. *In Alabama, You Could Pay the Utility \$9,000 for Having Solar on Your Roof*. Green Tech Media, January 2018. Available at <https://www.greentechmedia.com/articles/read/alabama-is-the-worst-solar-market-in-america>.

⁸⁶ Alabama Power 2019 IRP Summary Report, Available at <https://www.alabamapower.com/content/dam/alabamapower/Our%20Company/How%20We%20Operate/Regulations/Integrated%20Resource%20Plan/IRP.pdf>

⁸⁷ Alabama Power Petition for Certification of Convenience and Necessity, Alabama Public Service Commission. Docket No. 32953. September 2019. Available at <https://www.pscpublicaccess.alabama.gov/pscpublicaccess/page/docket-docs/PSC/DocketDetails.aspx>.

⁸⁸ Mississippi Power Company's Notice of IRP Cycle Pursuant to Commission Rule 29, Mississippi Public Service Commission. Docket No. 19-UA-231. December 2019. Available at https://www.psc.state.ms.us/InSiteConnect/InSiteView.aspx?model=INSITE_CONNECT&queue=CTS_ARCHIVEQ&docid=646546.

sites,⁸⁹ with another 33 MW of distributed solar as of the end of 2018.⁹⁰ Mississippi Power has not publicly stated plans to build any more solar in the next few years.

Georgia Power 2019 IRP

Georgia Public Service Commission, Docket # 42310

In its 2019 IRP, Georgia Power proposed to add 1,000 MW of solar—predominantly utility-scale—by the end of 2022. Synapse (on behalf of Sierra Club) and other intervenors presented analyses demonstrating that more solar was economic for customers than was called for by Georgia Power. An agreement with Commission staff increased the amount of solar to 1,650 MW; however, in a subsequent hearing, Commission Chairman Lauren “Bubba” McDonald moved to increase the solar procurement to 2,210 MW, stating, “I determined Georgia has the ability to add significantly more renewable energy and solar energy using a market-based approach without any upward pressure on the rate payers and no state subsidies.”⁹¹ The other Commissioners voted unanimously to approve the largest solar increase in Georgia Power’s history.

DOMINION ENERGY

Virginia Power will have approximately 760 MW of non-utility owned solar installed on its system by the end of 2020. The utility plans to add another 480 MW of solar capacity between now and 2033 according to the company’s 2018 IRP update. After the filing of its 2019 IRP Update, Virginia Power committed to having 3,000 MW of onshore wind and solar online or in development by 2022. It also suspended a request for proposals targeting “dispatchable peak capacity,” but said that it might reissue the request in the future if it determined capacity was needed.⁹²

Virginia Power is also planning to add offshore wind through the Coastal Virginia Offshore Wind (CVOW) facility. This resource was not part of the company’s base resource plan⁹³ in its 2018 IRP update. The first 12 MW were approved by the Virginia State Corporation Commission in November 2018,⁹⁴ and the

⁸⁹ 2018 Form EIA-860 Data - Schedule 3, 'Solar Technology Data' (Operable Units Only); and Ablaza, Kendra. *Miss. Power debuts largest solar power plant in the state*. Mississippi Today, July 2017. Available at <https://mississippitoday.org/2017/07/07/miss-power-debuts-largest-solar-power-plant-in-the-state/>.

⁹⁰ 2018 Form EIA-861 – Net Metering; 2018 Form EIA-861 – Non-Net Metering Distributed.

⁹¹ Georgia Public Service Commission. 2019. Media Advisory: Commission Adds 2,210 MW of Renewable Energy in Georgia Power 2019 Integrated Resources Plan.

⁹² Walton, Robert, *Dominion suspends plan to add 1.5 GW of peaking capacity as Virginia faces gas glut*, December 2019. Available at: <https://www.utilitydive.com/news/dominion-suspends-plan-to-add-15-gw-of-peaking-capacity-as-virginia-faces/568489/>

⁹³ The Company’s Plan A assumes that Virginia does not join RGGI and there is no CO₂ Tax.

⁹⁴ Case No. PUR-2018-00121, Final Order of the Virginia State Corporation Commission. November 2, 2018.

utility has submitted an application to the PJM interconnection queue for an additional 2,600 MW (to be added over three years 2024–2026).⁹⁵

Both of these moves were driven by actions at the legislative and executive level in the Commonwealth of Virginia. The Grid Transformation and Security Act, which passed in Virginia in 2018, calls for 5,000 MW of utility-operated solar and wind resources by 2028. Additionally, Executive Order Number 43, signed by Governor Ralph Northam in September 2019, calls for 30 percent of Virginia’s electricity to come from renewables by 2030 and to be carbon-free by 2050.⁹⁶

Dominion South Carolina has 280 MW of utility-scale solar on its system and another 133 MW of Distributed and Community solar (69 MW of which is net energy metering).⁹⁷ The utility plans to add another 289 MW of utility-scale solar over the next two years. However, it has no solar planned beyond that. It is important to note that Dominion South Carolina does not credit any new solar with any winter peak contribution (only summer). Therefore, in the utility’s planning processes, unpaired solar does little to decrease it’s need for future fossil peaking resources.

DUKE ENERGY

Despite being in what the nation refers to as the “sunshine state,” Duke Florida only owns 212 MW of solar capacity.⁹⁸ The utility outlines a plan to bring online an additional 1,328 MW of solar by 2029 in its 2019 Ten-Year Site Plan. However, the utility still projects that renewables will make up only 15 percent of its generation mix by 2028.⁹⁹ Most concerning is that the utility includes no plan to build energy storage. Energy storage allows solar to better align with peak system demands (especially winter peaking demands) and is essential in enabling the utility to transition away from its heavy reliance on gas.

According to Duke Kentucky’s 2018 IRP (for Ohio and Kentucky), the company will install 3.5 MW of solar annually starting in 2019 for a total of 51 MW by 2032. This is the least amount of solar installed on any utility’s system analyzed in this report (with the exception of Mississippi Power, which has no stated resource plan). The utility projects that only five percent of its total generation in 2032 will come from

⁹⁵ Walton, Robert, *Dominion proposes 2.6 GW offshore wind project, positioning Virginia as ‘hub’ for regional development*. Utility Dive, September 2019. Available at <https://www.utilitydive.com/news/dominion-proposes-78b-offshore-wind-project-positioning-virginia-as-hub/563332/>.

⁹⁶ Commonwealth of Virginia, Office of the Governor. 2019. Executive Order Number 43. Available at: <https://www.governor.virginia.gov/media/governorvirginiagov/executive-actions/EO-43-Expanding-Access-to-Clean-Energy-and-Growing-the-Clean-Energy-Jobs-of-the-Future.pdf>.

⁹⁷ South Carolina Electric & Gas 2019 Integrated Resource Plan. Public Service Commission of South Carolina. Docket No 2019-9-E. February 8, 2019.

⁹⁸ Duke Energy Florida. *Ten-Year Site Plan*. April 2019. Available at: <http://www.psc.state.fl.us/Files/PDF/Utilities/Electricgas/TenYearSitePlans/2019/Duke%20Energy%20Florida.pdf>.

⁹⁹ *Ibid.*

solar. This means the remaining 95 percent of the utility's generation will still come from fossil generation 12 years from now.

Duke Indiana currently only has 41 MW of solar capacity and 100 MW of wind capacity installed, according to its 2018 IRP. The utility projects it will add 1631 MW of solar, 600 MW of wind, and 5 MW of energy storage by 2037 under its preferred resource plan.¹⁰⁰ While these additions will move Duke Energy's towards its climate goals, the Duke Indiana still projects that majority of generation will be sourced from gas in 2037.

Duke Energy Progress and Duke Energy Carolinas are the leading subsidiary utilities with respect to renewables. These utilities are among the leaders nationally in installed solar capacity, with North Carolina ranking second in the nation.¹⁰¹ Among the two, Duke Energy Progress leads in its path to decarbonization, with no new gas planned and a projection to have a cumulative 4,629 MW of solar on its system by 2034.¹⁰² The utility also plans to add 238 MW of energy storage capacity by 2034 to better align solar with system needs.

Duke Energy Carolinas has the most solar planned of all utilities reviewed in this report, with a plan to add 2,801 MW by 2034.¹⁰³ Despite these additions from Duke Energy Carolinas, over half of Duke Energy's generation will be sourced from fossil fuels in 2040 based on current IRP projections.

THE COMPANIES DISCOURAGE COMPETITION FROM DISTRIBUTED AND CONTRACTED RENEWABLES

Southern Company, Dominion Energy, and Duke Energy each have at least small amounts of distributed solar on their systems. Small residential and commercial customers in some of these states are compensated under net energy metering policies that credit customers for the solar they generate at their retail rate. However, not all states offer net energy metering, and those that do generally have program caps (South Carolina caps the net energy metering program customer generator capacity at 2 percent of the company's previous five-year average retail peak demand).¹⁰⁴

Neither Georgia Power nor Alabama Power offer net energy metering to their customers, and Alabama charges all grid-connected solar customers a high \$5/kW/month charge on the grounds that the utility

¹⁰⁰ Duke Energy Indiana. The Duke Energy Indiana 2018 Integrated Resource Plan. July 2019.

¹⁰¹ Solar Energy Industry Association. SEIA. Top 10 Solar States. 2019. Available at: <https://www.seia.org/research-resources/top-10-solar-states-0>.

¹⁰² Duke Energy Progress. Integrated Resource Plan – Update Report. 2019.

¹⁰³ *Ibid.*

¹⁰⁴ SCE&G 2019 IRP.

still must provide back-up power to the customers. Mississippi Power offers net energy metering, as do Duke Energy and Dominion Energy.

Distributed generators that do not qualify for net energy metering (or do not have it available, such as those in Georgia and Alabama) are compensated at the PURPA avoided cost.¹⁰⁵ The avoided cost rate represents the cost the utility would otherwise pay to procure or supply the energy and capacity being supplied by the facility. As the number of solar facilities interconnecting to the grid has increased, utilities have discouraged competition from the other facilities by proposing lower and lower rates in the annual PURPA avoided cost dockets, adding significant solar integration charges, and making the interconnection process long and costly (*see the text box below*).

Duke Energy Carolinas, Duke Energy Progress, Virginia Power Company, and Dominion South Carolina Avoided Cost Dockets

Various avoided cost dockets before the North and South Carolina Public Utility Commissions

In North and South Carolina, Dominion Energy and Duke Energy have been fighting to keep the avoided cost that the companies are required to pay to qualifying solar PV facilities as low as possible. Each year, the state utility commissions review and approve the companies' PURPA avoided costs rates used to compensate qualifying facilities for the energy and capacity that they provide to the grid. However, as the quantity of solar on the companies' systems have increased, Dominion Energy and Duke Energy have been proposing lower and lower avoided energy and capacity values in each docket, on the basis that high penetrations of solar has pushed the peak to later and later in the day when solar no longer aligns with peak.¹⁰⁶

In addition to proposing lower avoided costs, the companies have also added large solar integration charges for new solar facilities, which the companies claim are necessary to cover the cost of additional reserve capacity needed to support the integration of additional variable renewable capacity.¹⁰⁷ Further, in North Carolina, Duke Energy proposed a provision in the 2018 avoided cost docket that would discourage solar qualifying facilities from adding storage to existing facilities, by requiring the facilities to forfeit their existing avoided cost rate and sign up again at the current lower rate if they modified their facility.¹⁰⁸

¹⁰⁵ Under the Public Utilities Regulatory Policies Act or PURPA, utilities are required to purchase electricity from qualifying facilities (generation facilities under 80 MW that generate electricity from renewables, biomass, waste, or geothermal resources), at the Company's avoided cost rate.

¹⁰⁶ See, for example, North Carolina Docket E-100, Sub 148; North Carolina Docket E-100, Sub 158; South Carolina Docket 2018-1-E; South Carolina Docket 2018-2-E; South Carolina Docket 2018-3-E.

¹⁰⁷ Docket No. E-100, Sub 158, Supplemental Notice of Decision, North Carolina Utilities Commission. October 7, 2019.

¹⁰⁸ Direct testimony of Devi Glick, North Carolina Docket E-100, Sub 158.

4.5. THE COMPANIES' GRID MODERNIZATION EFFORTS ARE NOT EQUAL TO THE TASK

Our electricity system is transforming from a one-way power delivery network in which customers passively receive electricity to a two-way flow of both power and information in which customers both receive and produce electricity. If the three companies are to be successful in achieving their stated decarbonization goals, they must operate the distribution grid differently. System flexibility is critical for a utility to maintain grid stability while integrating variable renewable resources, whether utility-scale, community-scale, or distributed energy resources. Within a decarbonized system, the utility must also more dynamically balance supply and demand (and voltage) so that demand is able to follow supply. This requires advanced grid operation that enables increased grid visibility, and at times control, through automation, increased communication, and sensors.

The three companies we assessed are only beginning this journey. To understand the magnitude of the challenge, the recently released GridWise Report¹⁰⁹ suggests a three-phase investment strategy:

Phase 1. Connect and protect: To connect growing numbers of distributed energy resources without compromising local power reliability, utilities will continue to invest in grid modernization. Granular modeling and forecasting methodologies, and greater visibility over connections, will be critical to better understand the scale and scope of distributed energy resource deployment.

Phase 2. Sense and enable: Investment in sensors to automate and control the network will create situational awareness at the grid edge and enable improved real-time monitoring and control. Ultimately, as distributed energy resource uptake accelerates, utilities will invest in DERMS [Distributed Energy Resource Management Systems], either as standalone implementations or phased into a broader ADMS [Advanced Distribution Management Systems] strategy.

Phase 3. Optimize and control: As the U.S. energy model becomes increasingly decarbonized, decentralized, and digitized, utilities must prepare to take on higher level responsibilities. They will make investments in distributed intelligence at the grid edge through advanced, real-time management and control of local distributed energy resources. As platform providers, they will transact in innovative products and services offered by utilities, partners, and other third parties. By streamlining and securing reliable power supply, they will become trusted system orchestrators.¹¹⁰

Each of the three companies has entered into the “Connect and Protect” stage. They have made some effort to increase operational visibility and control on the distribution grid with the deployment of

¹⁰⁹ *In an accelerated energy transition, can US utilities fast-track transformation?* (A GridWise Alliance and EY Collaboration, December 2019) <https://gridwise.org/wp-content/uploads/2019/12/Perspectives-on-a-Future-Distribution-System.pdf>, pp. 12 (hereinafter “GridWise Report”) at pp. 10-11 and 36-38.

¹¹⁰ *Ibid*

Advanced Metering Infrastructure (AMI) and, in some instances, voltage optimization. None appear to have initiated comprehensive integrated distribution planning.

THE VALUE OF ADVANCED METERING INFRASTRUCTURE (AMI) INVESTMENTS HAS NOT BEEN OPTIMIZED

AMI is a fundamental component of grid modernization. It is required to communicate information and send signals between customers and grid operators. However, Dominion Energy has not widely deployed AMI. Duke Energy and Southern Company have done so unevenly across their operating companies as shown in Table 11.

Table 11: AMI meter deployment by company (2018)

Utility Name	Customers with AMI	Total Meters	% of Customers with AMI
Duke Energy			
Duke Energy Carolina	2,348,082	2,465,786	95%
Duke Energy Progress	0	1,583,892	NA
Duke Energy Kentucky	143,137	145,451	98%
Duke Energy Ohio	716,445	731,573	98%
Duke Energy Indiana	566,659	851,053	67%
Duke Energy Florida	90,394	1,813,873	5%
Southern Company			
Alabama Power	1,453,402	1,453,402	100%
Georgia Power	2,497,637	2,498,431	100%
Mississippi Power	22	188,000	0%
Dominion Energy			
Virginia Electric & Power	429,115	2,620,455	16%
Dominion Energy South Carolina	23,996	733,742	3%

Source: EIA form 861, *Advanced Meters*. Available at <https://www.eia.gov/electricity/data/eia861/>.

Of the operating companies above that have installed AMI, none appear to be deriving the value of fully functional AMI integration. For instance, some Southern Company and Duke Energy utilities have installed AMI, but all have failed to provide their customers with access to their energy data through the industry standard “Green Button” access protocols.¹¹¹ As noted by the ACEEE report issued in January 2020, even providing customers with AMI data is not enough to derive the value of the AMI investment.¹¹² Utilities are failing to leverage AMI for “energy savings including time-varying pricing;

¹¹¹ See Utilities committed to Green Button. <https://www.energy.gov/data/green-button>.

¹¹² Gold, Rachel, Corri Waters, and Dan York, *Leveraging Advanced Metering Infrastructure To Save Energy* (ACEEE Report U2001, January 2020), p. iii. <https://www.aceee.org/leveraging-advanced-metering-infrastructure-save>.

more granular energy usage feedback, including time and locational value; customer targeting and technical assistance; programs that align payment with metered performance; and more actionable insights from evaluation, measurement and verification.”¹¹³

These companies’ failure to deploy and then effectively utilize AMI hobbles decarbonization efforts and places investor capital at risk. The Duke North Carolina experience provides an illustrative example of this failure and unnecessary risk. The North Carolina Public Utility Commission in approving Duke Carolinas investment in AMI found that AMI benefits, “current and future,” are “substantial.” However, the Commission cautioned that Duke Carolinas must follow through with actions to “capture the full benefits of AMI.”¹¹⁴ To make its point abundantly clear, the Commission directed that “within six months of the date of this Order, DEC [Duke Energy Carolinas] shall file in this docket the details of proposed new time-of-use, peak pricing, and other dynamic rate structures that will, among other things, allow customers in all customer classes to use the information provided by AMI to reduce their peak-time usage and to save energy.”¹¹⁵ The Commission warned that Duke Carolinas failure to act could result in a denial of recovery for AMI investments, placing shareholder capital at risk:

The Commission’s goal is to require DEC to develop rate structures now that will enable DEC to deliver on its promise that there are “additional customer products and services that this solution [AMI] can enable” no later than DEC’s next general rate case. Further, the Commission hereby gives DEC notice that DEC’s success, or lack thereof, in developing new rate structures that enable AMI energy usage benefits will be one of the factors used by the Commission in determining the prudence and reasonableness of DEC’s costs incurred in deploying AMI following the present rate case.¹¹⁶

Despite this clear directive and strong warning, Duke Carolinas failed to act. Rather than comply with the Commission’s order to file new rate designs within six months, the utility waited the full six months to file a status report informing the Commission that it would file “at least two pilot rate designs” at some point in the future characterized as “at the time of its next rate case or within nine months – whichever occurs earliest.”¹¹⁷ Duke Carolinas proposed that it would not file initial rate designs until three years had elapsed after the Commission’s approval of AMI investment.¹¹⁸ The Commission found “DEC’s

¹¹³ *Ibid.*

¹¹⁴ *Order Accepting Stipulation, Deciding Contested Issues, And Requiring Revenue Reduction*, N.C. PUC Docket E-7, Sub 1146 (June 22, 2018) p. 124. <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=80a5a760-f3e8-4c9a-a7a6-282d791f3f23>.

¹¹⁵ *Id.* at Ordering Paragraph 29, p. 331.

¹¹⁶ *Ibid.*

¹¹⁷ *Duke Energy Carolinas, LLC Rate Design Report*, N.C. PUC Docket No. E-7, Sub 1146 (December 21, 2018) p. 2 <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=f07ba79d-a9b1-410a-8895-b2beaa36335c>.

¹¹⁸ *Id.* at p. 8.

report and plan do not comply with the Commission's Rate Order and, therefore, are not accepted by the Commission."¹¹⁹ It ordered Duke Carolinas' witnesses to appear and answer for its failure to act at a hearing set the following month.¹²⁰

With the Commission's prodding, Duke Carolinas has moved to extract more value from the AMI investment it has made on behalf of its customers. The utility proposed nine advanced rate design pilots on April 1, 2019. It also revised its work plan for establishing permanent advanced rate designs, moving its Customer Connect program up by one year to June 2021 and implementation of new rates up to July 2021. The Commission posed additional questions to which Duke Carolinas responded in April and May 2019. Ultimately, the Commission approved nine pilots in July 2019.¹²¹ Duke Carolinas implemented the pilots and reported in November 2019, "The pilot rates have been successfully implemented. All residential pilots are fully subscribed, and small business pilots have sufficient participation to provide directional results."¹²² Duke North Carolina has committed to Green Button Download, the lesser Green Button standard, but even that has been delayed.¹²³ Its Prepaid Advantage program has been deferred indefinitely.¹²⁴

VOLTAGE OPTIMIZATION APPEARS TO BE UNDERUTILIZED

Voltage optimization is the process of reducing the voltage that an energy customer receives to reduce energy use, power demand, and reactive power demand. By controlling power factor and voltages, a utility can deliver energy more efficiently, empowering customers to use less electricity without changing their behavior or equipment. It can also be used to lower peak generation, making it possible for utilities to defer generation capacity investments.¹²⁵ If cost-effective voltage optimization were deployed throughout the United States, energy waste could be cut by 2.4 percent.¹²⁶ Overall the

¹¹⁹ *Order Declining to Accept Rate Design Plan* (NC PUC Docket No. E-7, SUB 1146, January 30, 2019) <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=12af76f3-f507-4352-92ec-32facb7eaba0>.

¹²⁰ *Ibid.*

¹²¹ *Order Accepting Revised Rate Design Plan* (NC PUC Docket E-7, SUB 1146, July 29, 2019) <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=6cceeef45-40ae-441e-8b01-a57f6f76c74e>.

¹²² E-7 Sub 1146 DEC's Dynamic Pricing Pilots Informational Filing (November 15, 2019) at p. 3. <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=8eac784a-9cb5-47ed-b36b-596f4b267f58>.

¹²³ *DEC and DEP Notice of Update to Data Access Functionality* (October 15, 2019) <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=27a0fab7-b704-43f0-adad-d0a9a9b80022>.

¹²⁴ DEP's Notice of Timing Revision for Prepaid Advantage Program Plan (August 2, 2019) <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=843aa5a0-6f9d-413b-8d29-b5aa45b193b0>.

¹²⁵ *Voltage and Power Optimization Saves Energy and Reduces Peak Power* (U.S. Department of Energy Fact Sheet, September 15, 2015) <https://www.smartgrid.gov/document/Voltage-Power-Optimization-Saves-Energy-Reduces-Peak-Power.html>.

¹²⁶ Schneider, KP, JC Fuller, FK Tuffner, R Singh, *Evaluation of Conservation Voltage Reduction (CVR) on a National Level* (Pacific Northwest National Laboratory, July 2010). <https://pdfs.semanticscholar.org/1c5f/e66936e7935500049ebefe6af6bbf86cc309.pdf>.

companies in this report have invested in voltage optimization in less than a third of the circuits they operate.

Table 12 shows the status of voltage optimization investments by the subsidiary utilities of the three companies. Among the utilities that reported data to the U.S. EIA on voltage optimization activities, only Duke Florida and Georgia Power have made serious efforts to deploy voltage optimization. Dominion has not reported its investment in voltage optimization; however, in 2016, it was reported that the company has deployed the technology.¹²⁷ Dominion Energy owns Dominion Voltage, a subsidiary that knows how to deploy voltage optimization and does it for other utilities.

Table 12: Companies are underinvesting in voltage optimization

Utility Name	Distribution Circuits	Circuits with Voltage Optimization	% Voltage Optimization
Duke Energy			
Duke Energy Carolinas, LLC	2,548	0	0%
Duke Energy Progress - (NC)	1,217	168	14%
Duke Energy Florida, LLC	1,283	1,155	90%
Duke Energy Indiana, LLC	1,12	-	-
Duke Energy Kentucky	125	-	-
Duke Energy Ohio Inc	747	281	38%
Southern Company			
Mississippi Power Co	276	0	0%
Alabama Power Co	2,250	3	0%
Georgia Power Co	2,500	2,000	80%
Dominion Energy			
Virginia Electric & Power Co	1,822	0	0%
Dominion Energy South Carolina, Inc	759	-	-

Source: EIA form 861, *Distribution Systems*. Available at <https://www.eia.gov/electricity/data/eia861/>.

Note: - means that a utility did not provide information.

COMPREHENSIVE INTEGRATED DISTRIBUTION PLANNING IS IN EARLY STAGES

Traditional distribution planning involved identifying where on the grid additional capacity may be required and where the lowest performing parts of the distribution network are located. Distribution planners use this information to identify solutions that could enable proactive capital plans to improve distribution system reliability. Within a modernized grid that must integrate resources at utility, community, and distributed scales, planning is much more complicated. “Planning becomes more cohesive and multidisciplinary with a wider and more complex range of engineering and economic

¹²⁷ Bacon, James. *Conservation Voltage Reduction: Dominion’s “Fifth Fuel.”* DVI, December 2016. Available at <https://dvigridsolutions.com/news/2016/12/conservation-voltage-reduction-dominions-fifth-fuel/>.

valuation issues.”¹²⁸ The National Association of Regulatory Utility Commissioners (NARUC) and the National Association of State Energy Officials (NASEO) with the support of the U.S. Department of Energy have created the Joint NARUC-NASEO Task Force on Comprehensive Energy Planning to develop new approaches that better align distribution system planning and resource planning processes.¹²⁹ Its referenced approaches include:

- Distribution system status review
- Hosting capacity
- Multi-scenarios for distribution planning
- Annual long-term distribution planning
- Interconnection studies and procedures
- Integrated Resource, transmission & distribution planning¹³⁰

Each of the three companies has recently articulated some level of recognition of the requirement for integrated distribution planning but none has undertaken it. Virginia Power (Dominion) described the inadequacy of traditional distribution system planning and stated the need for integrated planning in its *Grid Transformation Plan*:

The fundamental changes in the energy industry discussed in Section I drive not only the need to transform the distribution grid, but also to transform how distribution grid planning occurs. Appendix B provides a detailed overview of the Company’s current distribution planning process, the limitations of the current process, and the integrated distribution planning (“IDP”) process that the Company plans to implement going forward (the “IDP White Paper”). The IDP White Paper also details how the proposed Grid Transformation Plan investments are foundational to enabling true integrated distribution planning.¹³¹

¹²⁸ *Integrated Distribution Planning: Prepared on Behalf of the Minnesota Public Utilities Commission* (ICF, August 2016) p. 12. <https://www.energy.gov/sites/prod/files/2016/09/f33/DOE%20MPUC%20Integrated%20Distribution%20Planning%208312016.pdf>

¹²⁹ NARUC Task Force Webpage, Available at <https://www.naruc.org/taskforce/background/>.

¹³⁰ See generally, *Integrated Distribution Planning: Prepared on Behalf of the Minnesota Public Utilities Commission* (ICF, August 2016).

¹³¹ *Grid Transformation Plan*, Dominion Energy Virginia, 2019. Available at <https://www.dominionenergy.com/library/domcom/media/about-us/electric-projects/grid-transformation/smartenergy-grid-transformation-plan.pdf?modified=20191113183540>; presented in Direct Testimony Edward H. Baine, Senior Vice President – Distribution, Dominion Energy, Virginia State Corporation Commission Docket No. PUR-2019-00154 filed January 28, 2020. Available at <http://www.scc.virginia.gov/docketsearch/DOCS/4l%40g01!.PDF>.

Both Duke Energy Progress and Duke Energy Carolinas in South Carolina seek to establish an informational docket in which to share their grid planning information.¹³² Southern Company utility Mississippi Power Company shared its thinking on moving toward integrated distribution planning in January 2020.¹³³ Despite several forward-thinking pilots among Southern Company utilities, such as the Georgia Power and Alabama Smart Neighborhood Initiative,¹³⁴ distribution planning remains limited and siloed.¹³⁵

4.6. THE COMPANIES' CORPORATE ENGAGEMENT IS NOT ALIGNED WITH DECARBONIZATION

The companies described here continue to be members of pro-fossil trade associations and lobbying groups. In addition to the planning and operational actions described above, all three companies continue to pay membership dues to various pro-fossil trade associations that advance their fossil interests through various federal and state venues. All three companies are members of the American Coal Council, an organization that “represents the collective interests of the American coal industry—from the hole-in-the-ground to the plug-in-the-wall—in advocating for coal as an economic, abundant and environmentally sound fuel source.”¹³⁶ Southern Company was also one of the last two utilities remaining in the lobbying group American Coalition for Clean Coal Electricity, which it left in response to public criticism in December of 2019.¹³⁷ Duke Energy and Dominion Energy both contribute to the American Gas Association and Interstate Natural Gas Association Inc.^{138,139} They were also two of the top donors at the Utility Air Regulatory Group, a lobbying group that pushes for less stringent emissions

¹³² Public Service Commission of South Carolina Commission Directive, Order No. 2020-44, Docket No. 2019-381-E, January 15, 2020). Available at <https://dms.psc.sc.gov/Attachments/Matter/2d274850-3ec0-449f-beb3-7115fd40efc0>.

¹³³ Mississippi Power Company: Plan and Schedule for Its Annual Energy Delivery Plan, January 21, 2020. Filed in MS PSC Docket No. 2018-AD-064 Order Establishing Docket to Investigate the Development and Implementation of Integrated Resource Planning Rule on January 21, 2020. Available at <https://www.psc.state.ms.us/trinityview/mspsc.html?CASEYEAR=2014&CASENUM=118>.

¹³⁴ Georgia Power, Georgia Power Smart Neighborhood at Altus at the Quarter Webpage. Available at <https://www.georgiapower.com/residential/save-money-and-energy/smart-neighborhood.html>; Alabama Power Smart Neighborhood Webpage, available at <http://apcsmartneighborhood.com/>.

¹³⁵ A Customer Benefit Study of Distribution Investment for the Georgia Power Company System (May 2019) filed as Attachment STF-L&A-5-38 in the Georgia Power Company 2019 Base Rate Case, Georgia PSC Docket No. 42516 on May 9, 2019. <https://psc.ga.gov/search/facts-document/?documentId=178002>.

¹³⁶ 2019 American Coal Council Membership List, available at https://cdn.ymaws.com/www.americancoalcouncil.org/resource/resmgr/acc_/membership_list_12212019__1_.pdf.

¹³⁷ Storrow, Benjamin. *Under pressure, 2 utilities ditch pro-coal trade group*. EE News. December 2019. Available at <https://www.eenews.net/stories/1061700247>.

¹³⁸ Duke Energy. *Corporate Political Expenditure Report*. January 2019 – June 2019. Available at: https://www.duke-energy.com/_/media/pdfs/our-company/investors/januarytojune2019pacreport.pdf?la=en.

¹³⁹ Dominion Energy. *2018 Political Contributions and Lobbying Expenses*. 2018. Available at: <https://www.dominionenergy.com/library/domcom/media/investors/governance/political-contributions/2018-political-contributions-and-lobbying-expenses.pdf?modified=20190625135745&la=en>.

standards, until March 2019, when the group came under federal scrutiny from Congressional Democrats.¹⁴⁰

Additionally, Southern Company and Duke Energy have been fighting solar initiatives through ballot measures. In Florida, Duke Energy was the top contributor, along with Florida Power and Light Company, Tampa Electric Company, and Gulf Power Company (formerly a Southern Company utility) to a group advancing a “misleading”¹⁴¹ ballot measure that restricted and regulated solar providers to the benefit of the utilities.¹⁴² This measure was narrowly defeated.

5. COMPANIES’ EMISSION TRAJECTORIES MISS THE MARK

In the prior section, we reviewed Southern Company, Dominion Energy, and Duke Energy’s recent and planned actions relating to resource planning, capital investment, and distributed resources. In this section, we bring all the pieces together to provide a simplified picture of what these companies’ future resource plans look like, and what this means for their future emission trajectories.

It is important to note that the level of transparency, the data available, and the planning timeframe vary significantly by utility. This means we have a clearer picture of some of the utilities’ future plans than others:

- Mississippi Power does not have a public IRP (however, the Commission ordered Mississippi Power to prepare an IRP for the first time, due in November 2020)¹⁴³
- Georgia Power and Alabama Power’s IRPs are heavily redacted and provide only minimal public information
- Duke Energy Florida has a Ten-Year Site plan instead of a full IRP
- Dominion and Duke Energy Carolinas, Duke Energy Progress, Duke Energy Indiana, and Duke Energy Ohio (Kentucky) have IRPs

¹⁴⁰ Bade, Gavin. *Utilities flee UARG as Congressional Dems tee up probe into lobbying group*. Utility Dive, April, 2019. Available at <https://www.utilitydive.com/news/utilities-flee-uarg-as-congressional-dems-tee-up-probe-into-lobbying-group/552939/>.

¹⁴¹ Klas, Mary Ellen, *Florida voters say no to misleading solar amendment*, Miami Herald Times. November, 2016, Available at <https://www.miamiherald.com/news/politics-government/election/article113449438.html>.

¹⁴² *Big Business Ballot Bullies*, Public Citizen. September, 2016. Available at <https://www.citizen.org/wp-content/uploads/big-business-ballot-bullies-corporate-money-report.pdf>.

¹⁴³ Mississippi Power Company’s Notice of IRP Cycle Pursuant to Commission Rule 29, Mississippi Public Service Commission. Docket No. 19-UA-231. December 2019. Available at https://www.psc.state.ms.us/InSiteConnect/InSiteView.aspx?model=INSITE_CONNECT&queue=CTS_ARCHIVEQ&docid=646546.

5.1. CURRENT RESOURCE PLANS IMPLY EMISSION TRAJECTORIES FAR ABOVE LEVELS NEEDED TO DECARBONIZE BY 2050

Figure 8 in Section 3 shows the CO₂ reduction trajectories required to meet each of the companies' interim and long-term goals, assuming a linear reduction in emissions between both the present and interim goal, and then between the interim and the long-term goals.¹⁴⁴ Duke and Dominion have both pledged to be net-zero by 2050, while Southern Company has vaguely pledged to be either net-zero or achieve 80 percent reduction below 2007 levels by 2050. All three companies selected as their baseline a high emissions year.

We used the following simplified methodology to project the three companies' current CO₂ trajectories:

- **Resource portfolio (capacity by generator type):** We began with EIA form 860m data from October and November 2019 on existing fossil, nuclear, and hydro resources by utility. We reviewed company IRPs and ten-year site plans, company websites, and news releases on updates since the IRP was published, to find renewable capacity as well as planned resource retirements and additions.
- **Generation:** We calculated capacity factors by resource type for fossil and hydro resources based on EIA 860 and 923 data from 2019. We supplemented these when there were specific capacity factors available in the IRPs. For renewable resources, we used capacity factors from IRPs, and NREL ATB, and EIA state-level average data. We held these calculated capacity factors constant, by resource type, and applied them to the companies' planned future resource portfolios to find future projected generation. These calculations do not account for purchases and sales.
- **Future load:** We made no adjustments to match generation to projected future load; thus, the generation levels presented here likely do not meet the companies' future electric demand.
- **Projected emissions:** We calculated emissions rates by resource type based on EIA 2018 data on CO₂ emissions at electric power plants. We applied the emissions rates to the projected generation levels to find our projected emissions line.

We projected generation levels using these business-as-usual (BAU) assumptions because only a handful of the utilities (Duke Indiana, Duke Florida, and Duke Kentucky) provided future generation projections. We note that, even for those utilities that provided such projections, there is a great deal of uncertainty around what will actually materialize. In this case, however, uncertainty also means there is a significant opportunity for the utilities to do better.

If the companies, for example, shut down their fossil units earlier than currently planned, build less gas than planned, ramp up renewable deployment, or minimize how much they run their remaining fossil

¹⁴⁴ Here, for simplicity, we're using a linear trend towards zero emissions by 2050. In practice, it seems likely that for an emissions curve to reach zero by 2050, it would have to start with steeper reduction early on, since reductions may become more difficult or expensive as the last tons are squeezed out. In other words, there should be a curve and the implied 2040 emission level consistent with a net-zero by 2050 would be lower than what we've assumed in this analysis.

units, then their emissions will be lower than projected here. The figures below show our BAU projection of emissions based on available data; however, future analysis based on more transparent planning and actionable commitments from the utilities could show a different story.

Our analysis of the three companies' resource plans finds that they all are missing the mark. While some existing coal is retiring, the majority is being replaced with new gas-fired capacity. A "zero by 2050" goal requires substantial CO₂ emissions reductions by 2040. Overall, looking ahead to 2040, the Southern Company, Dominion Energy, and Duke Energy's power plant fleets will likely emit roughly double this quantity of CO₂ emissions. Further, with each companies' heavy reliance on gas, even the companies that show a downward emissions trajectory through 2040 will see their emissions rapidly plateau at or near the 2040 levels unless they make a drastic change in future gas build plans.



Figure 10: Southern Company nameplate capacity of future resource plans (2019–2040)

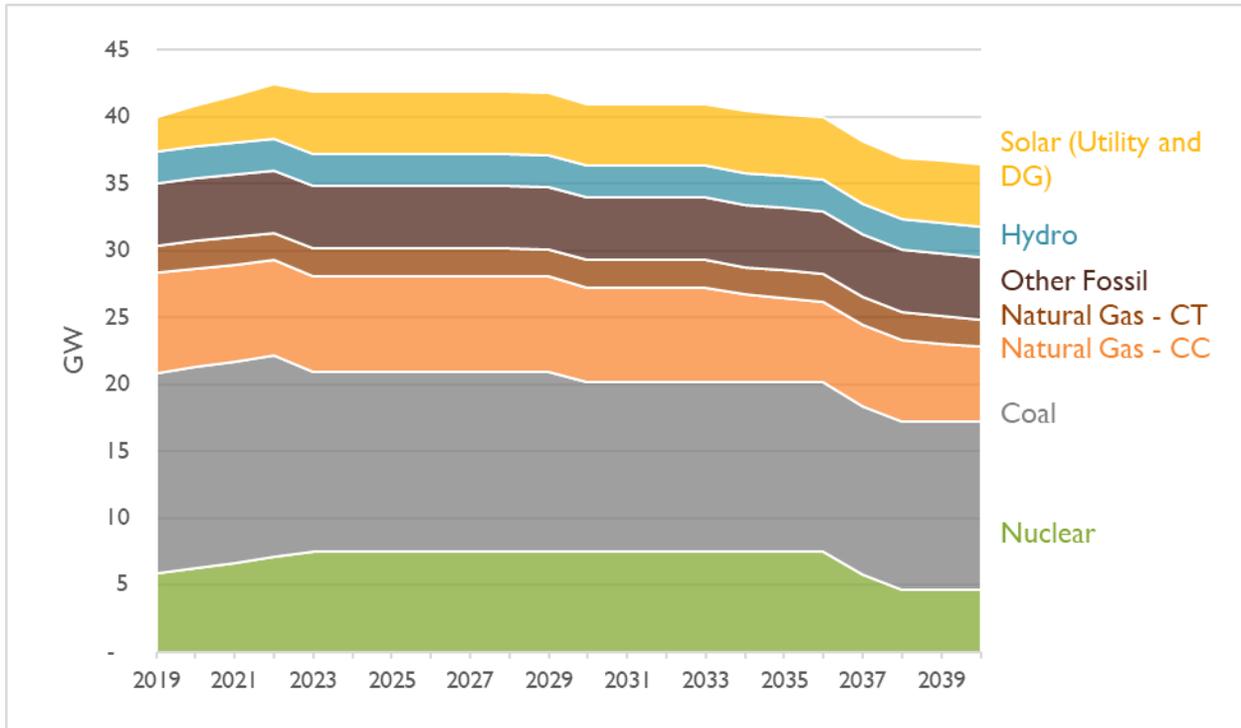
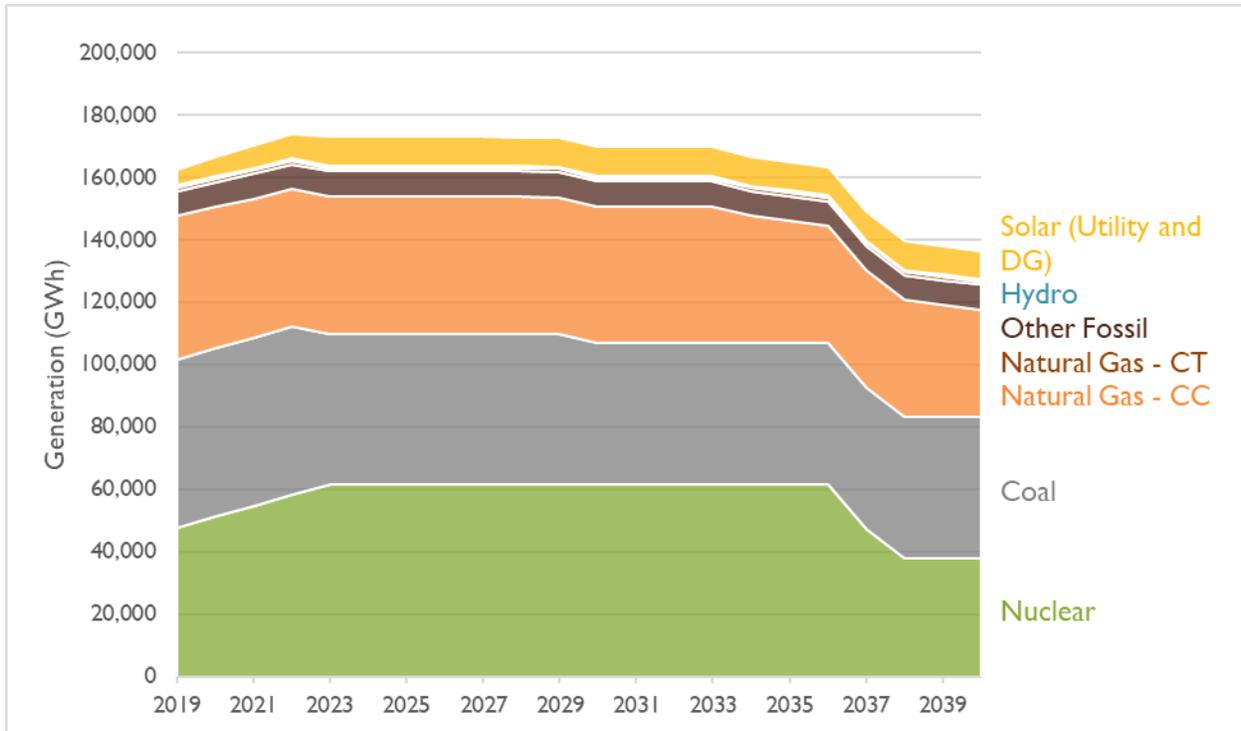


Figure 11: Southern Company projected generation (2019–2040)



Source: EIA form 860m, November 2019, EIA 923m November 2019, EIA Carbon Dioxide Emissions at Electric Power Plants supplemented by Georgia Power 2019 IRP and Alabama Power 2019 IRP.

Figure 12: Southern Company projected emissions (2019-2040)

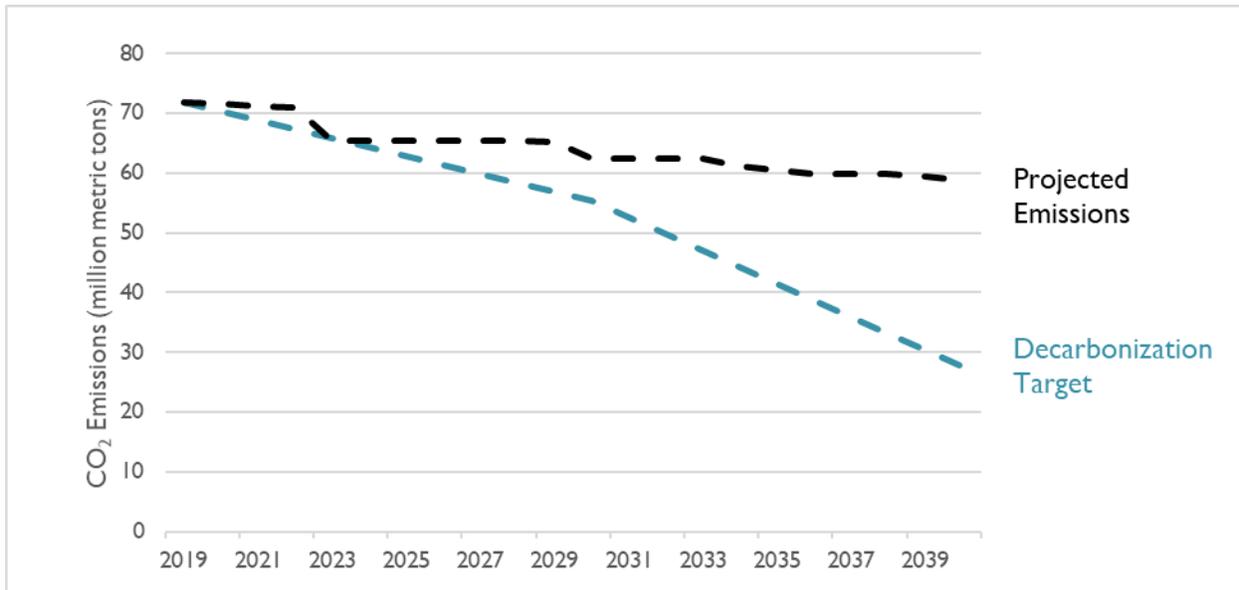


Figure 10, Figure 11, and Figure 12 show Southern Company’s projected capacity, generation, and emissions between 2019 and 2040 based on available public information on Alabama Power, Georgia Power, and Mississippi Power’s current and planned resource mix. As mentioned above, much of the information on Southern Company’s projections is not publicly available. Based on Southern Company’s current resource plans, its emissions are projected to barely drop between now and 2040. In order to meet their 2030 interim goals, Southern Company’s electric utilities would need to cut their emissions almost in half over the next 10 years. It is clear that their current plans do not at all align with their stated goals and will not get them to decarbonization, or even 80 percent below 2007 levels by 2050.

Figure 13: Dominion Energy nameplate capacity of future resource plans (2019–2040)

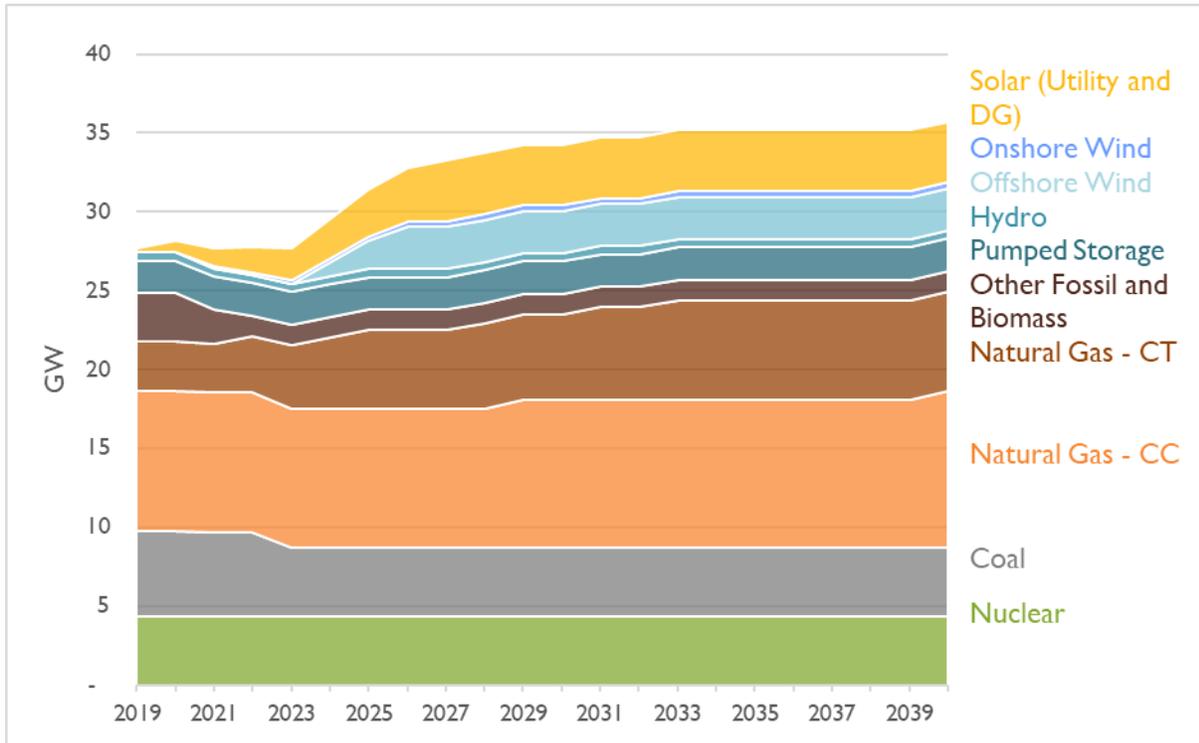
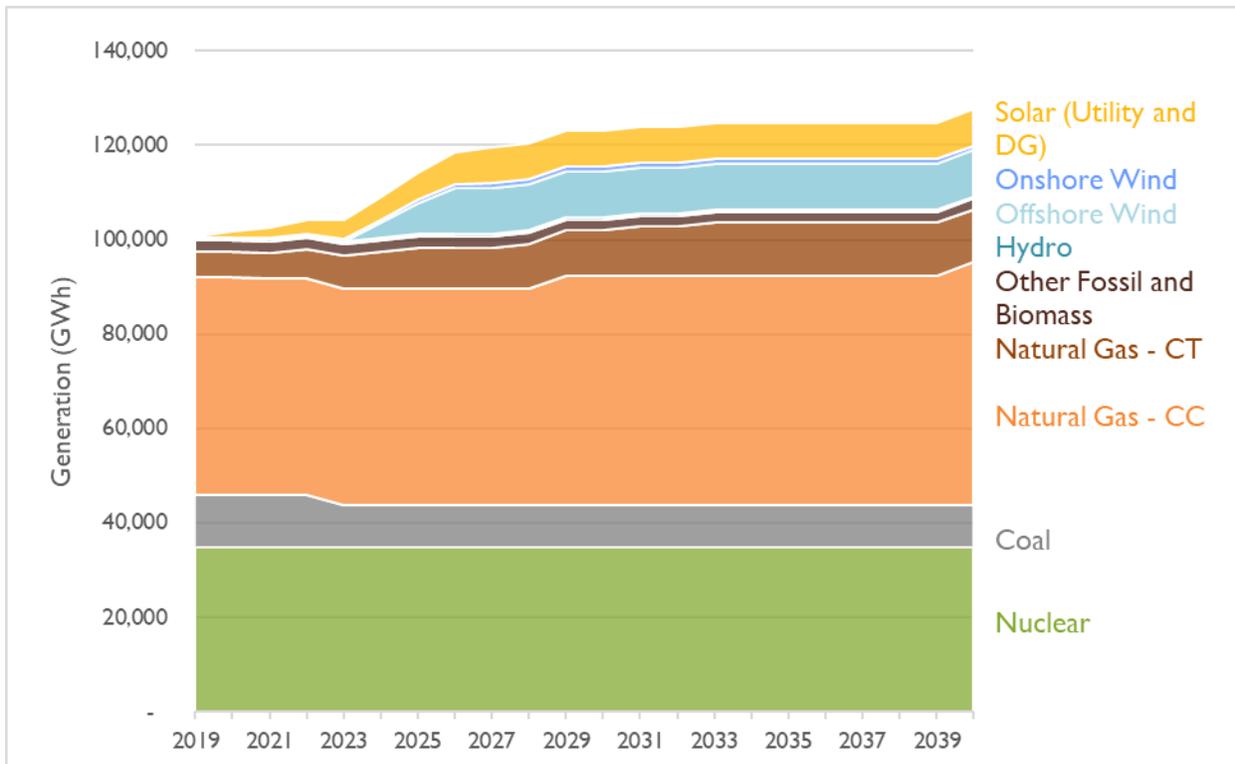


Figure 14: Dominion Energy projected generation (2019–2040)



Source: EIA form 860m, November 2019, EIA 923m November 2019, EIA Carbon Dioxide Emissions at Electric Power Plants supplemented by Virginia Power's 2018 IRP and Update to the 2018 IRP, and SCE&G's 2019 IRP.

Figure 15: Dominion Energy projected emissions (2019–2040)

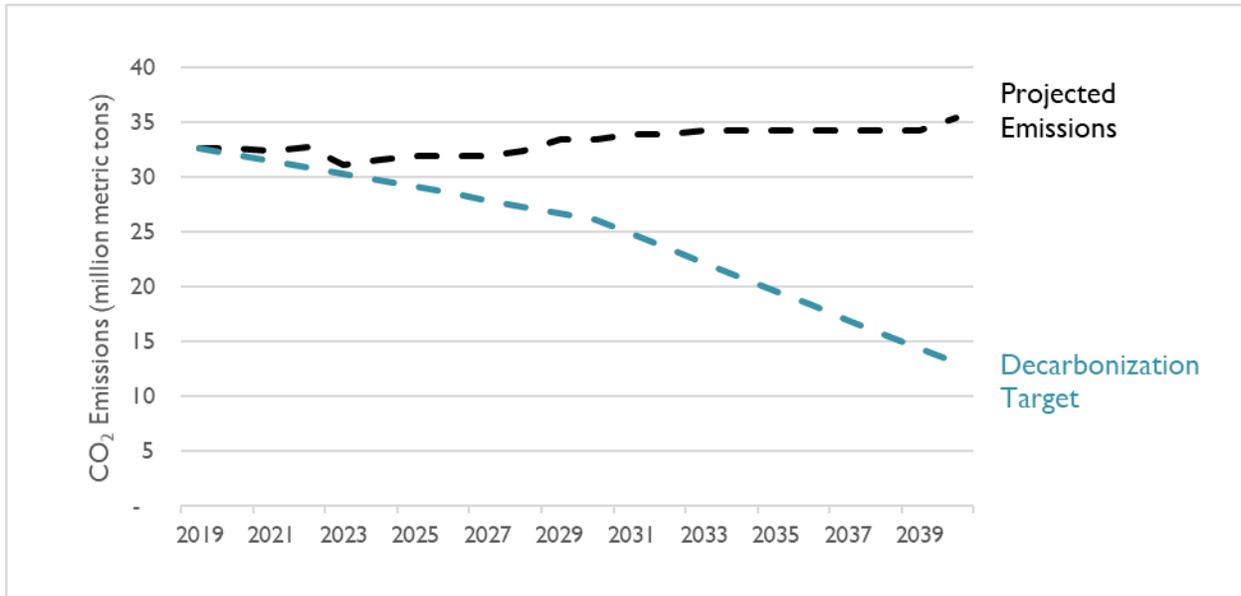


Figure 13, Figure 14, and Figure 15 show Dominion Energy’s projected capacity, generation, and emissions between 2019 and 2040 based on available public information Virginia Power and Dominion South Carolina’s current and planned resource mix. Based on the utilities’ projected resource mix, emissions will barely go up between now and 2040, and Dominion Energy will be nowhere near meeting its 2050 decarbonization goal.

Figure 16: Duke Energy nameplate capacity of future resource plans (2019–2040)

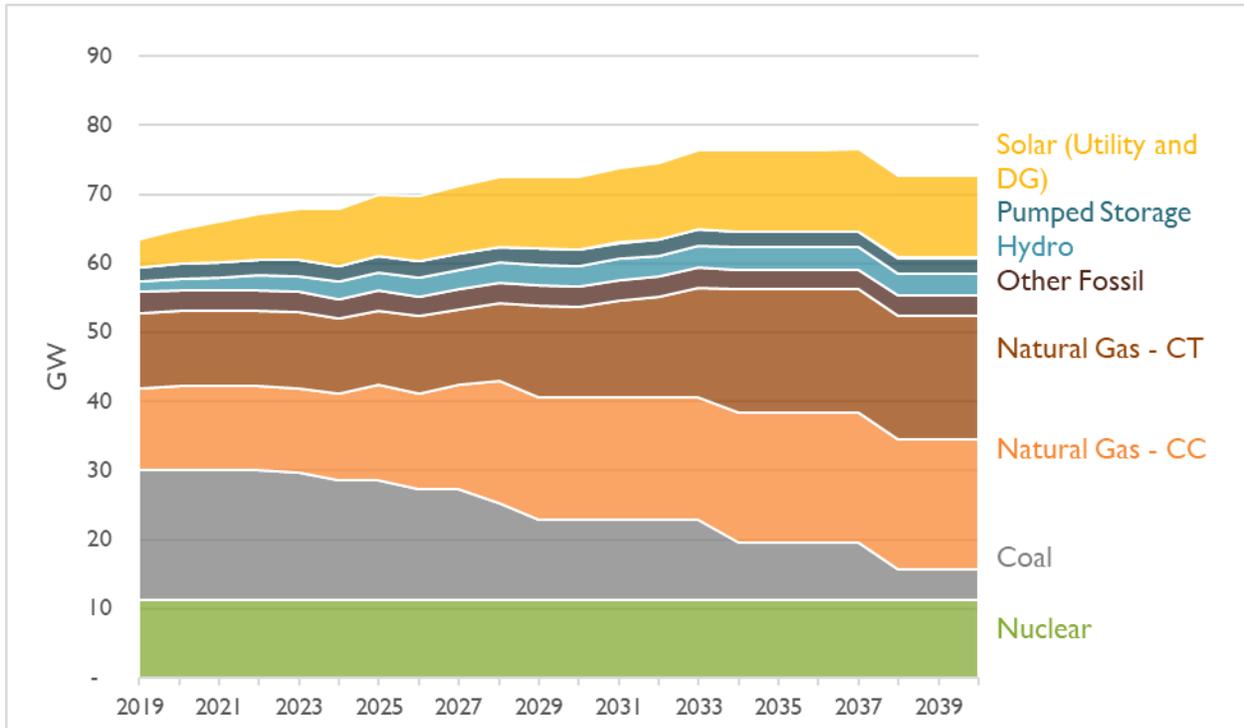
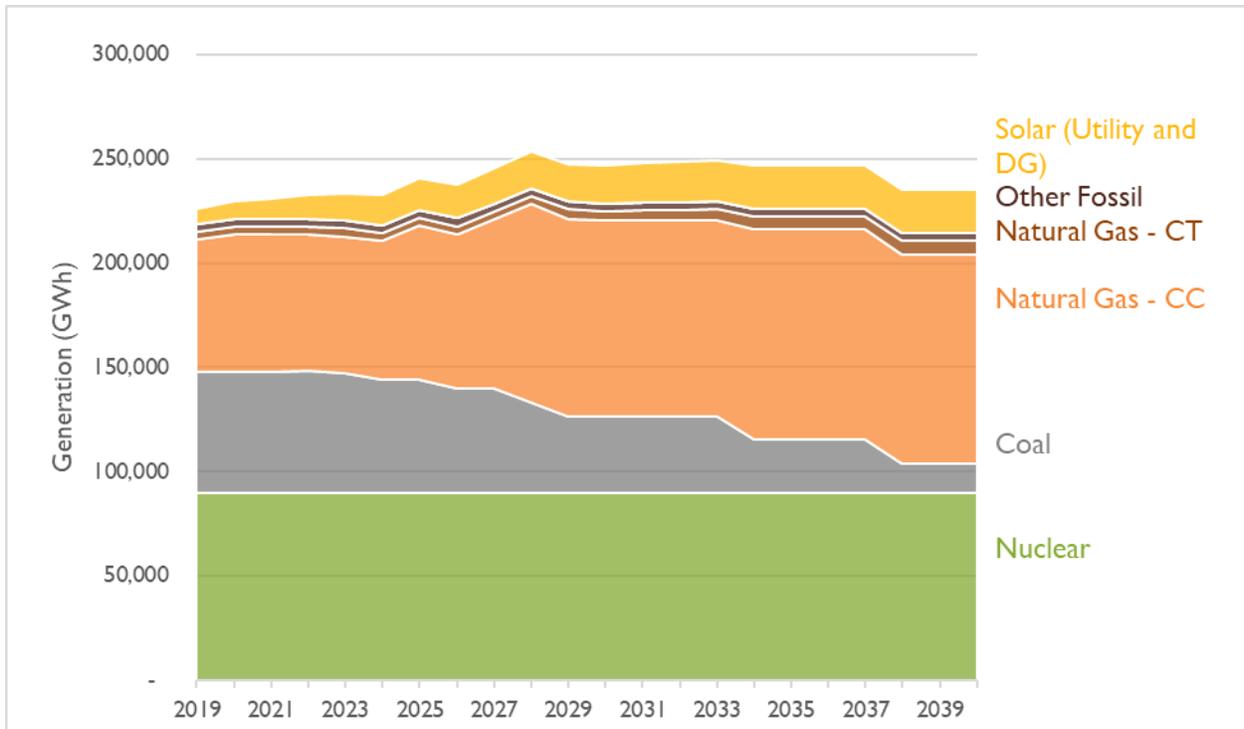


Figure 17: Duke Energy projected generation (2019–2040)



Source: EIA form 860m, November 2019, EIA 923m November 2019, EIA Carbon Dioxide Emissions at Electric Power Plants supplemented by Duke Energy Carolinas NC 2018 IRP and 2019 IRP Update, Duke Energy Progress NC 2018 IRP and 2019 IRP Update, Duke Energy Florida 2019 Ten-year site plan, Duke Energy Indiana 2018 IRO, Duke Energy Kentucky 2018 IRP.

Figure 18: Duke Energy projected emissions (2019–2040)

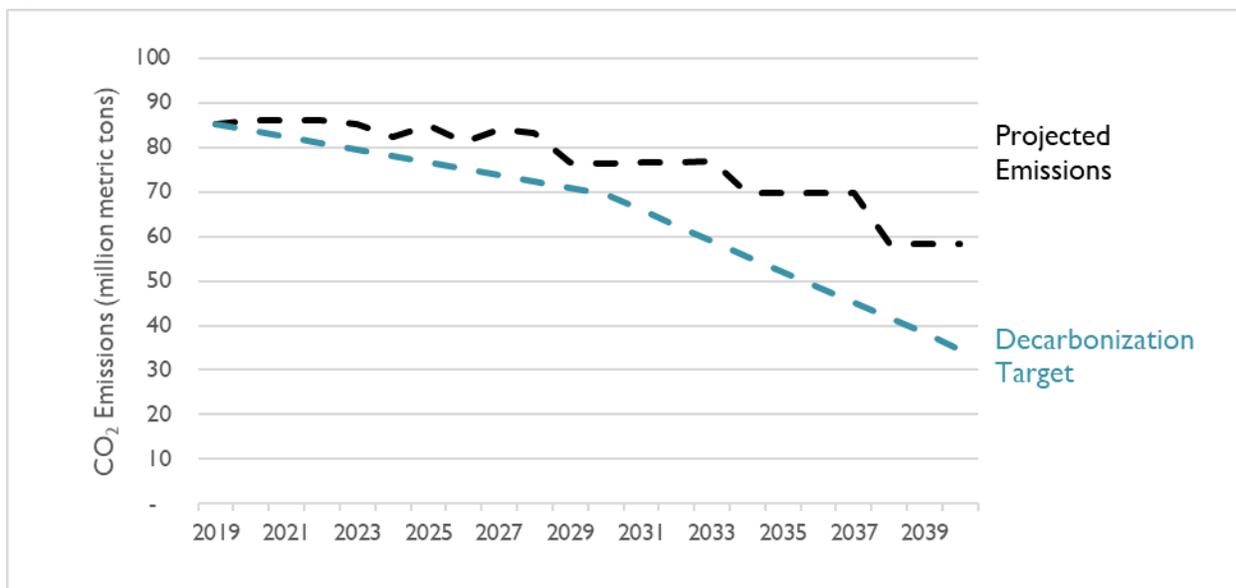


Figure 16, Figure 17, and Figure 18 show Duke Energy’s projected capacity, generation and emissions between 2019 and 2040 based on public information on Duke Carolinas, Duke Progress, Duke Indiana, Duke Ohio (Kentucky) and Duke Florida. While Duke Energy is projected to decrease emissions between now and 2040, emissions levels will still be significantly above where the company needs to be in order to reach its 2050 decarbonization goal. Further, the company’s reliance on gas will cause its emissions to plateau at levels far above zero. While retirement of the majority Duke’s coal fleet is a good thing, the company’s reliance on gas generation presents a barrier to the company continuing on a downward emissions trajectory.

5.2. MANY CURRENT AND PLANNED FOSSIL RESOURCES HAVE A USEFUL LIFE BEYOND 2050 AND WILL RESULT IN STRANDED ASSETS OR MISSED DECARBONIZATION GOALS

The three companies’ fossil fleets contain a considerable amount of aging coal capacity ripe for retirement. However, the utilities also have a large amount of new natural gas capacity, and their plans include a substantial increase over the next two decades. All gas units built over the last decade will be less than 40 years old by 2050, all gas units built today will be exactly 30 years old by 2050, and all gas units built going forward will be under 30 years of age by 2050. Gas plants generally have a useful life of up to 40 years, meaning that any plant built or planned to be built after 2010 will still have remaining useful life in 2050.

A plant that retires before the end of its useful life is referred to as a stranded asset. These stranded assets have not provided customers the value they were promised when the unit was built. The plants will either (1) not be fully depreciated by the time they retire, and therefore customers will stuck be paying for the unit after it retires; (2) will be depreciated under an accelerated depreciation schedule, at a higher cost to customers through higher electricity bills; or (3) will be paid for by shareholders. This

last option will occur if the Commission holds the utility accountable for its poor decision-making and disallows recovery of the portion of the undepreciated asset from the rate base. The Commission could also disallow recovery of a rate of return on the remaining value of the asset.

Based on the three companies' current build-out plans, at least 35 GW of gas capacity will have not reached its useful life by 2050 (Table 13). Even if none of the new planned gas capacity is built, the companies still have 14 GW of gas capacity built in the last 10 years that will not be fully depreciated by 2050 (assuming a 40-year lifetime).

Table 13: Fossil capacity that must be retired by Southern Company, Dominion Energy, and Duke Energy by 2050 for full decarbonization

Resource	MW
Coal Capacity	
Coal with a retirement date before 2030	9,768
Coal with a retirement date beyond 2030	8,996
Coal without a retirement date	20,712
Total Coal left on system	39,476
Gas Capacity	
Gas built before 2012	33,073
New gas built (or converted) since 2012	13,918
New gas planned 2020-2030	14,278
New gas planned beyond 2030	7,396
New gas built and planned	35,300
Total gas and coal capacity	108,141

Source: EIA form 861m November 2019, company IRPs, supplemented by information from company websites.

5.3. THE RATE AND TRAJECTORY OF DEMAND-SIDE MANAGEMENT AND RENEWABLE DEPLOYMENT DO NOT MATCH THE NEED

Just as the three companies' planned reliance on fossil-based resources drastically undermines what is needed for them to decarbonize by 2050, their current renewable and battery storage build-out plans fall far short of what is needed to fill the energy, capacity, and grid service gap created when existing resources retire or load growth begins to materialize from electric vehicles and other types of electrification.

Right now, the companies' renewable build-out plans will add just 14 GW of solar capacity (nameplate),¹⁴⁵ 3,652 MW of wind, and 600 MW of battery storage (a portion of which is paired with

¹⁴⁵ The EIA defines generator nameplate capacity as "the maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate."

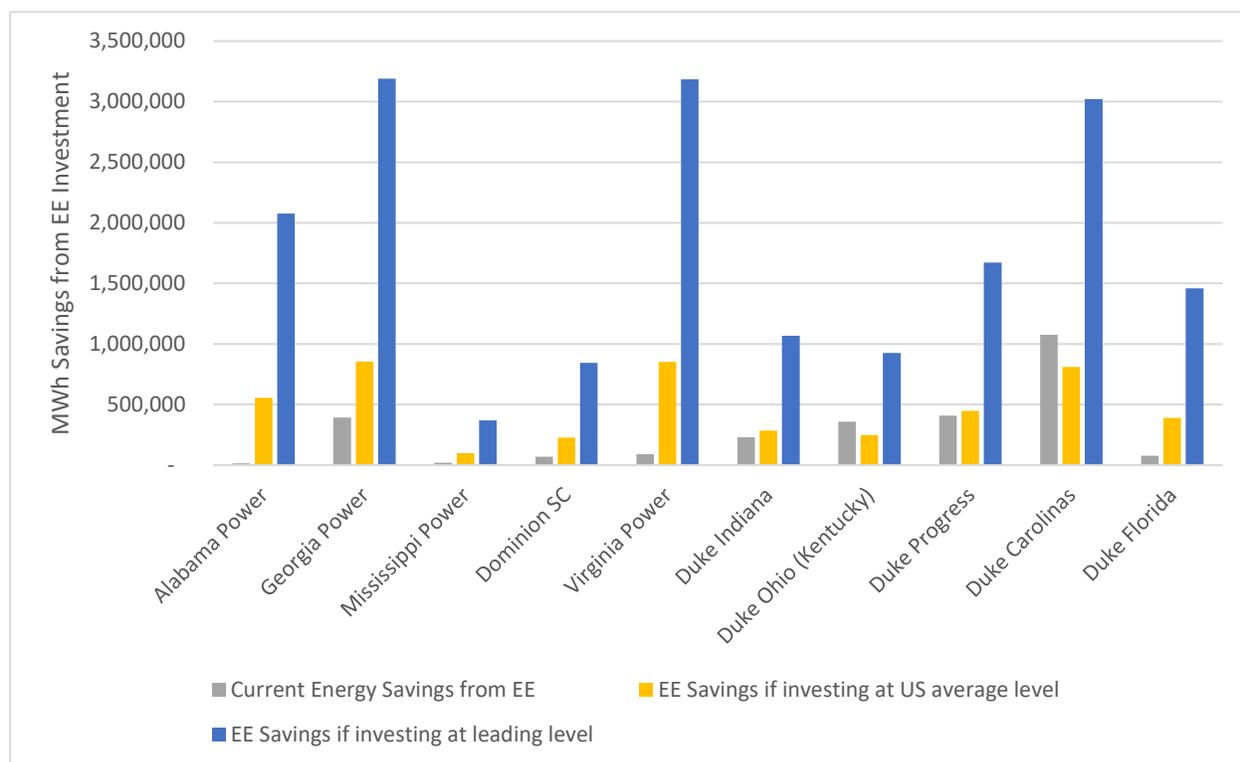
solar) in the next few decades.¹⁴⁶ This renewable capacity will replace less than half of coal capacity that needs to come offline as soon as possible (and much less on a firm capacity basis, which is the amount of capacity which the utility claims it can rely on during system peaks). These planned renewable additions do not begin to address the gas capacity that also needs to retire, and future load growth from electric vehicles and other electrification. Further, without a ramp-up in planned storage projects, the planned solar will not be able to replace all services provided by thermal resources. While the solar currently planned is an improvement over historical levels, it is clear that the companies' solar (and storage) build-out plans are nowhere near sufficient to put the three companies on a path to decarbonization.

Southern Company, Dominion Energy, and Duke Energy also lag far behind where they need to be in energy efficiency and DSM program investment. Decarbonization requires that these companies increase their energy efficiency investments to a leading level. However, currently none of the Southern Company or Dominion Energy's utilities, and only two of Duke Energy's utilities, have even reached national average levels of energy efficiency investment (Figure 19). If these companies were serious about decarbonization, their future energy efficiency plans would in the near term ramp up to national average levels. Over the mid-term, their plans would ramp up to leading levels. However, the energy efficiency forecasts included in the utility IRPs do not show this level of commitment to DSM.

capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.”

¹⁴⁶ Company IRPs.

Figure 19. Energy efficiency savings equivalents for national average and leading utility savings levels



Source: EIA f861, 2018 Sales and EE tables, *ACEEE 2020 Utility Energy Efficiency Scorecard.

6. MINIMUM ACTIONS REQUIRED FOR DECARBONIZATION

In the prior sections, we reviewed what Southern Company, Dominion, and Duke are saying about their efforts to decarbonize and what they actually are doing to decarbonize. We demonstrated how their actions are not likely to result in achievement of each company’s stated 2030 or 2050 goals. In this next section, we will introduce a list of actions that, from our experience, are necessary in the near term to put these companies on the path to decarbonization. While necessary, these actions are not sufficient for the three companies to achieve full decarbonization by 2050. These actions include: (1) rooting all future plans and actions in robust science-based CO₂ targets; (2) conducting comprehensive retirement and replacement analyses to determine the least-cost path to retire each company’s existing fossil fleet as rapidly as possible and replace it with alternative zero-carbon portfolios; (3) investing in renewables and demand-side resources to meet all future resource needs; (4) invest in grid-modernization solutions; and finally (5) evaluating and planning for changing system needs—including load growth driven by electrification instead of traditional steady demand.

6.1. ACTION: ALIGN ALL ACTIONS WITH CO₂ REDUCTION TRAJECTORIES AND TARGETS

Southern Company, Dominion Energy, and Duke Energy have all announced CO₂ interim and long-term targets that get them to zero, net-zero or 80 percent below a baseline-year level of carbon emissions by

2050. Once the companies set their goals, they would logically move forward with resource planning and investment decisions that move them closer to these goals. However, as discussed above, the current actions by Southern Company, Dominion Energy, and Duke Energy are not putting them on the path to decarbonization.

To correct this, the three companies must start by providing clear and transparent projection of the generation and emissions levels associated with their current resources plans. For the most part, the companies and their subsidiaries have projected capacity build plans, but not long-term generation and emission projections. Capacity does not produce CO₂ emissions—generation does. These companies are making planning and investment decisions based on assumptions about how long and how much they plan to continue to operate each unit, and these assumptions should be public.

Moving forward from this starting point, the companies should anchor all current and future planning decisions around their CO₂ targets. This means that as a part of every IRP (or site plan), rate case, application for an environmental rider, DSM program review, avoided cost and net energy metering docket, CPCN application, grid modernization docket, and any other significant docket or planning exercise, the companies should be required to: (1) explain how the proposed action aligns with its long-term CO₂ goals; (2) evaluate the impact that the proposed action will have on emissions goals relative to the most recent generation and emissions trajectory; and (3) defend any impacts on customers, such as stranded asset risk, that may result.

6.2. ACTION: DEVELOP LEAST-COST PLANS, SUPPORTED BY ROBUST ANALYSIS, TO RETIRE AND REPLACE ALL FOSSIL UNITS

As discussed in Section 4, each company still relies on large amounts of coal and gas capacity. Some of this capacity is aging coal-fired generation that needs to be retired in the near term. Some of it is natural gas generation added more recently that has decades of useful life remaining. To ensure a smooth transition to a decarbonized electricity system, the utilities should all be identifying milestone dates by which they need to retire certain amounts of fossil generation in order to stay on track for decarbonization. In the near term, the subsidiary utilities should focus on retiring all the uneconomic aging coal units. However, over the longer term, the three companies should focus more broadly on what quantities of fossil-based generation need to come offline and by when. For all coal units, the companies should provide a full capital investment plan for the remainder of the unit life, so that the Commission can evaluate the reasonableness of the proposed investment and set investment caps for particular plants, as has happened in Georgia.¹⁴⁷

Once coal (and gas plants) are retired, the three companies should focus on evaluating what the system actually needs in the absence of the retired unit, rather than on replacing exactly what was retired. It is important that Commissions and utilities recognize this distinction. Replacing the exact resource will not

¹⁴⁷ Commission Order Adopting Stipulation as Amended. Georgia Public Service Commission, Docket # 42310. July, 2019.

only be unnecessarily costly to customers, but also may not meet system needs in terms of energy, capacity, demand flexibility, and other grid reliability and control needs. Instead, the utilities need to evaluate non-fossil replacement portfolios that include a combination of renewables, battery storage, renewables paired with battery storage, DSM (energy efficiency and demand response), market purchases, and grid modernization efforts.

6.3. ACTION: INVEST IN RENEWABLE, DEMAND-SIDE, AND FLEXIBLE RESOURCES TO MEET FUTURE NEEDS

In developing replacement portfolios, the utilities should begin with the least-cost resource available: energy efficiency. As discussed in Section 4 above, all of Duke Energy, Dominion Energy, and Southern Company's utilities ranked poorly on energy efficiency investment and program performance. Dominion Energy, Southern Company,¹⁴⁸ and two of Duke Energy's utilities ranked at or just outside the bottom 10 in the nation for energy efficiency investment and performance by ACEEE's utility energy efficiency report card. And most of Duke Energy's utilities ranked slightly higher, but still in the bottom third.¹⁴⁹ These utilities should all set near-term goals to ramp-up energy efficiency investment at least to the national average. However, it is important that the utilities focus not just on quantity of energy efficiency investment, but also on type. Most, if not all, of the utilities in the Southeast now claim to have either winter-peaking or dual-peaking systems. In this context, investment in winter DSM is key for managing winter peak and bringing the system back to summer peaking, where solar can provide summer peaking capacity.

The utilities should next focus on resources that offer demand flexibility. With increased quantities of renewables on the electricity grid, utilities are claiming they need to build new gas peaking capacity (combustion turbines or reciprocating engine units) to balance the grid. However, demand response and battery storage can provide the same level of demand flexibility to balance the grid, and likely at a lower cost. Any additional grid services that the system needs, such as voltage support, can easily be provided by stand-alone solutions or alternatively by converting the retiring coal asset into a synchronous condenser.

To fill energy and capacity gaps, the utilities should focus on renewables and battery storage, either stand-alone or paired, and the utilities should not consider any new fossil resources. To ease the transition, they should facilitate the process of procuring and building renewables by doing the following:

- Streamlining, and standardizing where possible, RFP and bidding processes to lower costs and decrease the lead time needed to procure and build renewables

¹⁴⁸ As noted in section 3 above, Mississippi Power was not included in the rankings based on its small size.

¹⁴⁹ Relf, Grace, Brendon Baaz, and Seth Nowak. *2017 Utility Energy Efficiency Scorecard*. American Council for an Energy-Efficiency Economy. June 2017.

- Increasing transparency about the cost trajectories and projections for renewables, battery storage, and traditional fossil resources on which their resource planning decisions rely
- Simplifying the interconnection process for distributed energy resources and renewables

Doing all of these things, and many more, will remove some of the barriers that are currently slowing the pace of renewable deployment for these, and other, utilities.

6.4. ACTION: EVALUATE AND INVEST IN GRID MODERNIZATION SOLUTIONS

Next, Duke, Dominion, and Southern Company need to increase investment in grid modernization solutions and integrate grid modernization planning into the resource planning process. Doing so will allow renewables to be more efficiently integrated and utilized by customers and by the subsidiary utility. Decarbonization of the electricity sector cannot occur without grid modernization, and action on grid modernization needs to be taken in earnest starting now. As observed in the GridWise report, “time is not on utilities’ side as energy transition overturns conventional business models.”¹⁵⁰ Utilities must swiftly build critical capabilities in the following areas:

- Integrated planning—customer adoption modeling; customer and demand-side analytics and standardized platforms for coordinating distribution-level and transmission system planning
- Asset management—weather analytics; improved asset performance and condition data; real-time grid monitoring and predictive maintenance analytics
- System management—remote sensing and drone technologies; wearables and augmented or virtual reality and back-office robotic process automation
- Systems operations—Distributed Energy Resource Management Systems (DERMS); Advanced Distribution Management Systems (ADMS); real-time system optimization and enhanced forecasting and modeling tools
- Flexibility management—advanced energy storage; non-wires alternative solutions; dynamic market-pricing mechanisms and ancillary distributed energy resource services managed at the distribution-level
- Commercial operations and customer management—electric vehicle charging; connected home and energy services; vehicle-to-grid services and peer-to-peer trading¹⁵¹

¹⁵⁰ *In an accelerated energy transition, can US utilities fast-track transformation?* (A GridWise EY Collaboration, December 2019), p. 12. <https://gridwise.org/wp-content/uploads/2019/12/Perspectives-on-a-Future-Distribution-System.pdf>.

¹⁵¹ *Id.*, p. 9.

The GridWise report offers a useful roadmap for staging these investments.¹⁵² Any utility intending to decarbonize its operations should endeavor to work through each of these steps and stages as rapidly as possible.

6.5. ACTION: EVALUATE AND PLAN FOR CHANGING SYSTEM NEEDS

In designing retirement and replacement plans, the three companies need to be planning for the electricity system they have and the system they will have in the future, not the system they used to have. Traditional load growth is flat or falling. Utilities can no longer count on steady 1–2 percent annual load growth, and they can no longer design resource portfolios around projections of steadily increasing demand growth.

They need to instead plan for likely future load growth that will come from electric vehicles and beneficial electrification (for example, installation of heat pumps and conversion from natural gas heating to electric heating). New load growth offers opportunities for enhanced demand flexibility to support integration of a greater percentage of renewable resources. New load growth also presents an opportunity to design the system right from the start (rather than struggling to change ingrained customer behavior). Utilities can do this by introducing new rate designs structured to incent customer behavior to align with system needs.

Duke, Dominion, and Southern Company should evaluate how robust the resources and portfolios they are considering are against future uncertainty. They should understand which resources are nimbler and allow a more flexible build-out and smaller lead time. They should know which do not meet these needs and can only be built in large quantities with large lead times. They should understand the level of operational flexibility with each resource, and whether a resource can offer the system multiple monetizable value streams. They should understand the level of risk and uncertainty associated with resources that rely on potentially volatile fuel sources rather than zero-cost fuel sources. And finally, they should focus immediately on no-regrets decisions, such as investing in energy efficiency and reducing coal plant dispatch during uneconomic periods.

¹⁵² *In an accelerated energy transition, can US utilities fast-track transformation?* (A GridWise EY Collaboration, December 2019), p. 37.