

SOUTHERN ALLIANCE FOR CLEAN ENERGY

TRACKING DECARBONIZATION IN THE SOUTHEAST

GENERATION + CO₂ EMISSIONS
FIFTH EDITION



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ABOUT SOUTHERN ALLIANCE FOR CLEAN ENERGY

The Southern Alliance for Clean Energy is a nonprofit organization that promotes responsible and equitable energy choices to ensure clean, safe and healthy communities throughout the Southeast. As a leading voice for energy policy in our region, SACE is focused on transforming the way we produce and consume energy in the Southeast.

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CONTENTS

EXECUTIVE SUMMARY	3
DUKE ENERGY	5
SOUTHERN COMPANY.....	6
NEXTERA ENERGY	7
TENNESSEE VALLEY AUTHORITY.....	8
DOMINION ENERGY SOUTH CAROLINA	9
REGION: STILL OFF TRACK	10
APPENDICES	11
ADDITIONAL RESOURCES FROM SACE	13

EXECUTIVE SUMMARY

CLIMATE IN CRISIS

Communities across the Southeast, particularly frontline communities, are already experiencing the impacts of the climate crisis. From heat waves and hurricanes to blackouts caused by extreme winter weather, we have felt these impacts across our region over the past year. We are living the reality of this climate crisis. From here on out, every ton of a greenhouse gas emitted, every resource decision to continue to rely on fossil fuels or switch to clean resources, and every policy to drive electrification matters.

Scientific guidance to avoid worsening impacts of the climate crisis is to limit warming to 1.5° C. The key to this is reducing greenhouse gas emissions. We now have two major pieces of federal legislation designed to aid in decarbonization: the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA). Together, these laws will accelerate renewables, energy efficiency, and electrification... but will it be enough?

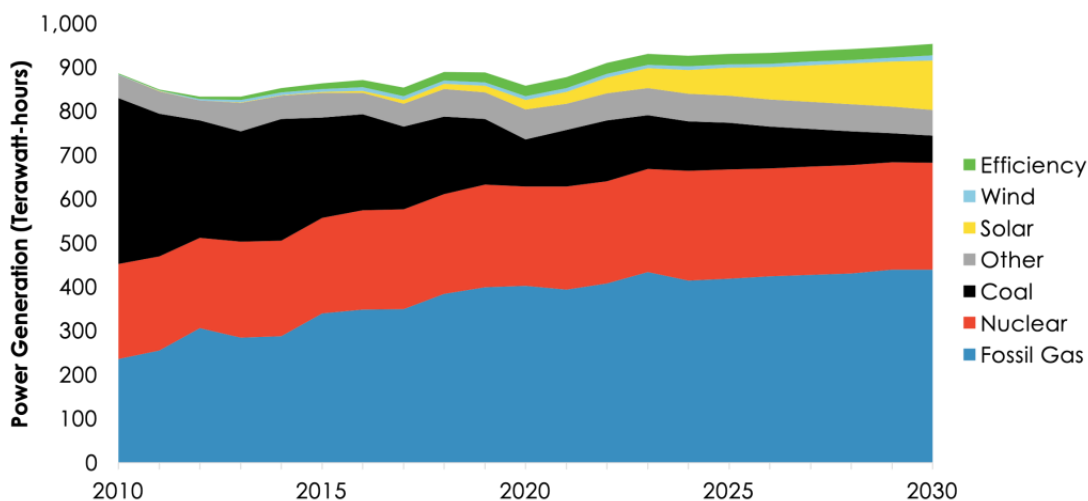
To answer this question, SACE has compiled historical data from the past decade, and utility resource plans, called Integrated Resource Plans (IRPs). Generation and carbon dioxide (CO₂) emissions figures are tied to the utility or state where the power is consumed, and not where it is generated or emitted.

This report focuses on one key sector: electric power. Transportation and electricity are the two highest emitting sectors in the Southeast. Electricity also plays a key role in decarbonizing other sectors, such as transportation, through electrification. For example, because electric vehicles are so efficient, even when the emission intensity of electricity is above zero there is the potential for significant emission reductions through electrification. However, overall emissions are lower the more we reduce the emissions from electricity generation.

ELECTRICITY GENERATION RESOURCES CHANGING

The projected resource mix across the region, based on current utility plans as of summer 2023, shows a decrease in coal, an increase in solar, and a continued reliance on fossil gas. Fossil gas generation is projected to increase by 2030 as utilities such as Duke Energy, the Tennessee Valley Authority, and Dominion Energy South Carolina plan to add new gas-fired generation to their fleets. This move is despite gas plants experiencing recent reliability issues that lead to widespread blackouts.

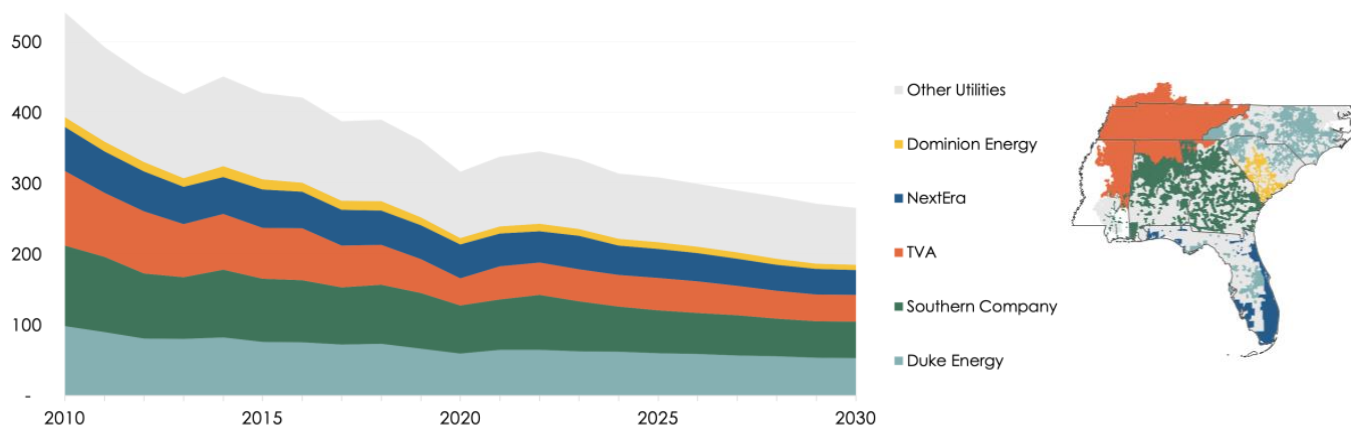
SOUTHEAST GENERATION BY FUEL TYPE, 2010-2030



FEDERAL LEGISLATIVE IMPACT STILL ON ITS WAY

CO₂ emissions from electricity generation are largely dependent on how much electricity is used and the resources used to generate that electricity. After a steep decrease in emissions in 2020 – largely due to lower electricity demand driven by the COVID-19 pandemic – emissions rebounded in 2021 though remained below the 2019 level. Annual emissions are projected to remain above 2020's level until 2024 as utilities continue to burn coal and gas to meet increased load. Emission reductions from 2022 through 2030 are largely driven by the reduction in coal and increase in solar generation across the region, with energy efficiency also reducing emissions.

SOUTHEAST CO₂ EMISSIONS (MILLION TONS) BY UTILITY SYSTEM



To bring forecasts in line with the Biden Administration's target of reaching zero emissions by 2035, **emissions need to be closer to 120 million tons by 2030**. Regional emissions from the power sector are still projected to be over double that target.

Since many utilities do not update resource plans annually it may be several years before we see the long-term emission reduction impacts of the BIL and IRA in these projections. Florida requires a simplified Ten-Year Site Plan every year, North Carolina requires a Carbon Plan every two years, South Carolina and Georgia require IRPs every three years, and TVA does an IRP every five years. However, shifts in certain resources, particularly the long-term forecast for solar generation, are already trending higher.

COAL-GAS TRADE-OFF DOWNPLAYS METHANE

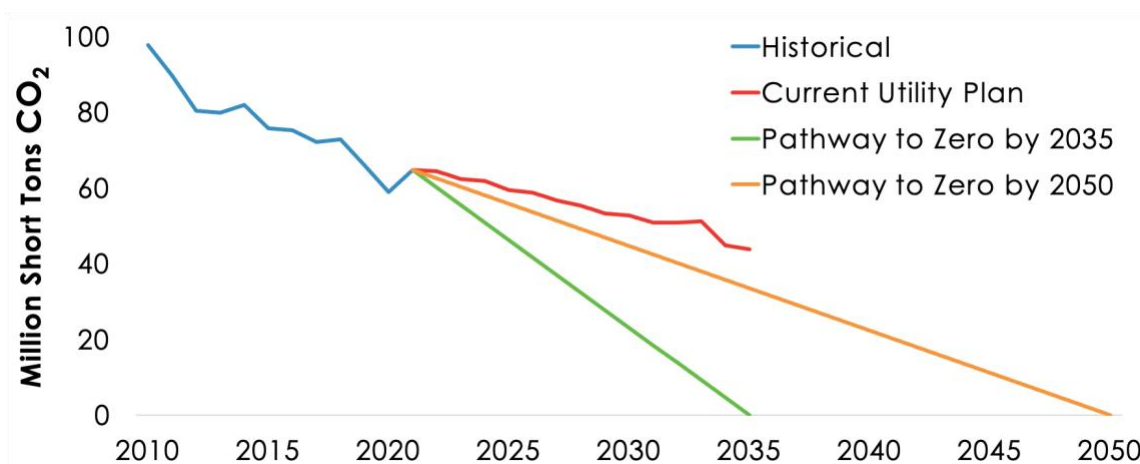
The emissions impact of declining coal generation will be hindered by rising fossil gas consumption. Even utilities with carbon-reduction goals such as Duke Energy, Southern Company, and TVA are pursuing gas. There are indirect greenhouse gas emissions from the production and distribution of gas, which includes the potent greenhouse gas methane. Estimates of leakage rates are highly variable, ranging from approximately 1-5%. Since methane leakage is not tracked per power plant, figures presented here are only CO₂ from fuel combustion. Inclusion of methane leaks into these figures would blunt the emission reduction projections presented in this report.

DUKE ENERGY

Duke Energy’s three utilities in the region, Duke Energy Carolinas (DEC), Duke Energy Progress (DEP), which are both in North and South Carolina, and Duke Energy Florida (DEF), which operates solely in Florida, are *not* on track with a trajectory to decarbonize by 2035 let alone 2050. Duke’s continued practice of swapping coal for gas is slowing its decarbonization significantly.

Duke’s two Carolinas utilities will begin a new integrated resource plan (IRP) and carbon plan in the fall of 2023, and if those resource plans swap more fossil energy for clean energy, it could bend Duke’s curve further down toward a pathway to zero. However, without influence from the Florida Public Service Commission or state policy makers, we do not expect major changes in the future resource plans of Duke Energy Florida. That means DEF will continue to slow Duke’s overall decarbonization.

DUKE ENERGY PLANS VS. PATHWAYS TO ZERO



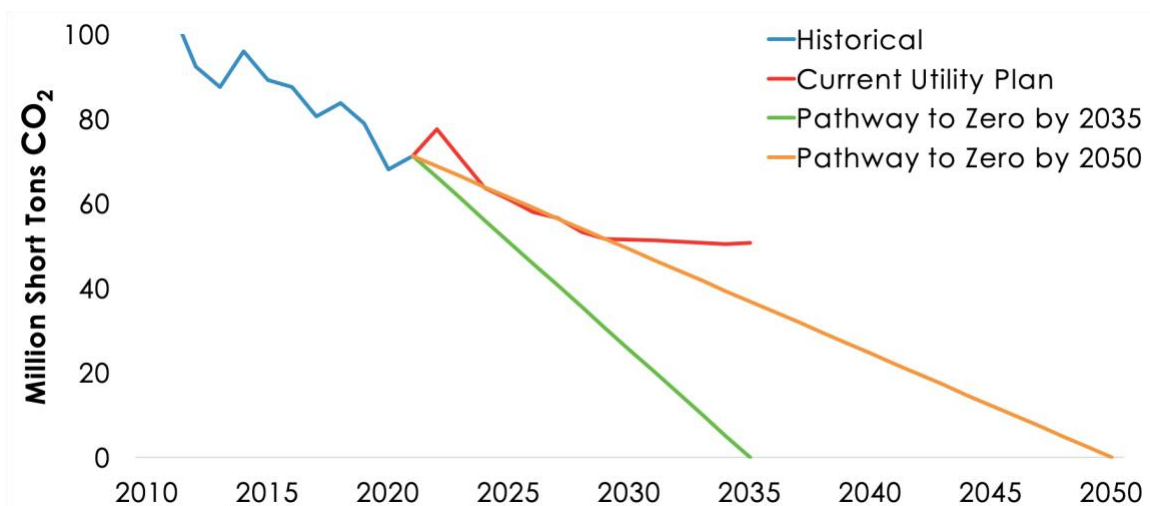
Duke’s utilities in the Carolinas are proposing new gas power plants despite already increasing gas generation significantly between 2010 and 2021. With a continued heavy reliance on gas in Florida, Duke’s emission intensity in CO₂/MWh can only drop so far.

Utility Name	Resource Mix (% of Power)				Carbon Dioxide (CO ₂)			
	Energy Type	2010	2021	2030	Metric	2010	2021	2030
Duke Energy	Fossil Fuels	64%	59%	51%	Million Tons	98	65	53
	Solar & Wind	<1%	5%	15%	Lbs/MWh	1,117	756	576
DEC	Fossil Fuels	49%	45%	43%	Million Tons	41	29	24
	Solar & Wind	<1%	4%	8%	Lbs/MWh	965	685	535
DEP	Fossil Fuels	59%	50%	34%	Million Tons	28	14	7
	Solar & Wind	<1%	9%	26%	Lbs/MWh	1,156	613	303
DEF	Fossil Fuels	97%	95%	83%	Million Tons	29	22	21
	Solar & Wind	<1%	4%	16%	Lbs/MWh	1,375	1,055	949

SOUTHERN COMPANY

Georgia Power, Southern Company's largest subsidiary utility, underwent an IRP process in 2022 that overall, reduced emissions projections over the long-term. After an expected jump in emissions in 2021 as demand for electricity recovered from COVID-19, emissions are projected to decline, with reductions driven by declines in coal generation and fairly steady gas generation. This trajectory includes Vogtle units 3 and 4 going online in 2023-2024 and an increase in solar. Georgia Power's current plans project a steeper emission reduction than that of Alabama Power and Mississippi Power. There is a worrisome flattening of emissions after 2030 that will make it difficult for Southern Company to achieve zero emissions by 2050.

SOUTHERN COMPANY PLANS VS. PATHWAYS TO ZERO



Southern Company's utilities historically relied heavily on fossil fuels, and the utilities are phasing out or down coal, gas use essentially doubled between 2010 and 2021. The utilities continued reliance on gas hampers reductions in emission intensity from increased solar and nuclear.

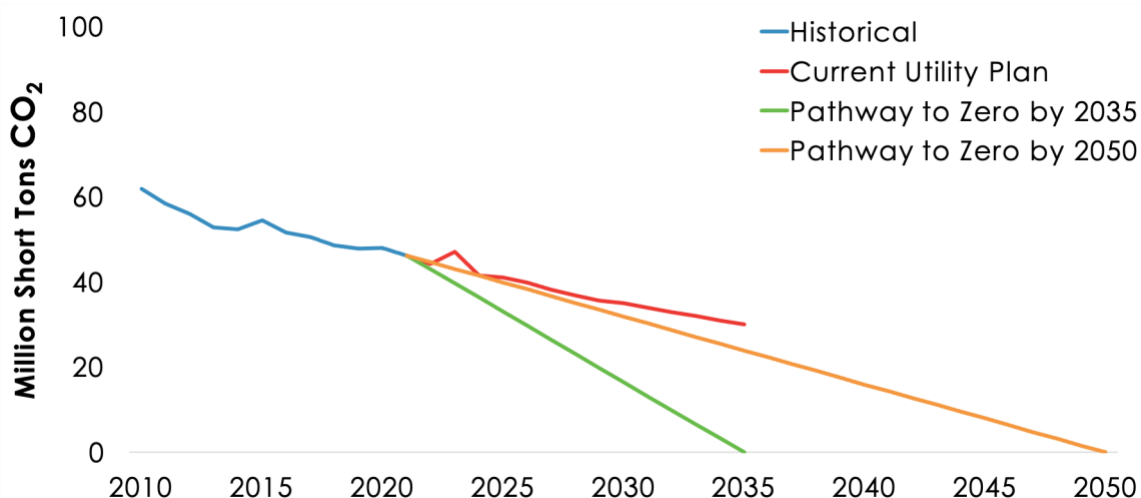
Utility Name	Resource Mix (% of Power)				Carbon Dioxide (CO ₂)			
	Energy Type	2010	2021	2030	Metric	2010	2021	2030
Southern Company ¹	Fossil Fuels	76%	66%	56%	Million Tons	114	71	52
	Solar & Wind	<1%	4%	12%	Lbs/MWh	1,410	947	674
Georgia Power	Fossil Fuels	77%	66%	50%	Million Tons	66	40	29
	Solar & Wind	<1%	5%	16%	Lbs/MWh	1,432	910	656
Mississippi Power	Fossil Fuels	100%	97%	89%	Million Tons	8	5	4
	Solar & Wind	<1%	3%	11%	Lbs/MWh	1,527	1,025	846
Alabama Power	Fossil Fuels	72%	60%	61%	Million Tons	40	28	19
	Solar & Wind	<1%	3%	5%	Lbs/MWh	1,355	992	674

¹ Historical figures for Southern Company do not include historical data for Gulf Power, which was sold to NextEra.

NEXTERA ENERGY

NextEra Energy, the parent company of utility Florida Power & Light and Gulf Power, which have now merged under the name Florida Power & Light or FPL, has seen one of the most significant changes in its emissions trajectory compared to our last report that was published recently after NextEra’s announced its “Real Zero by 2045” goal. The 2022 resource plans for FPL and Gulf did not appear to be fully aligned with that corporate plan. The resource plans released by FPL (and covering the legacy Gulf) in April 2023 include more solar and lead to an increase in the pace of decarbonization, though FPL will have to pick up the pace significantly after 2032, the last year of its current resource plan, to meet its “Real Zero” goal by 2045.

NEXTERA PLANS VS. PATHWAYS TO ZERO



FPL and the legacy Gulf Power system have a long history of reliance on fossil fuels – both coal and gas. While coal use declined significantly for the now-combined utility in 2021 and is expected to be zero by 2030, the percent of power from gas increased between 2010 and 2021, slowing the reduction in the utility’s reliance on fossil fuels. That reliance on gas creates a floor for the utility’s emission intensity, which, based on current utility plans is expected to be among the lowest among major utility parent companies in the Southeast by 2030.

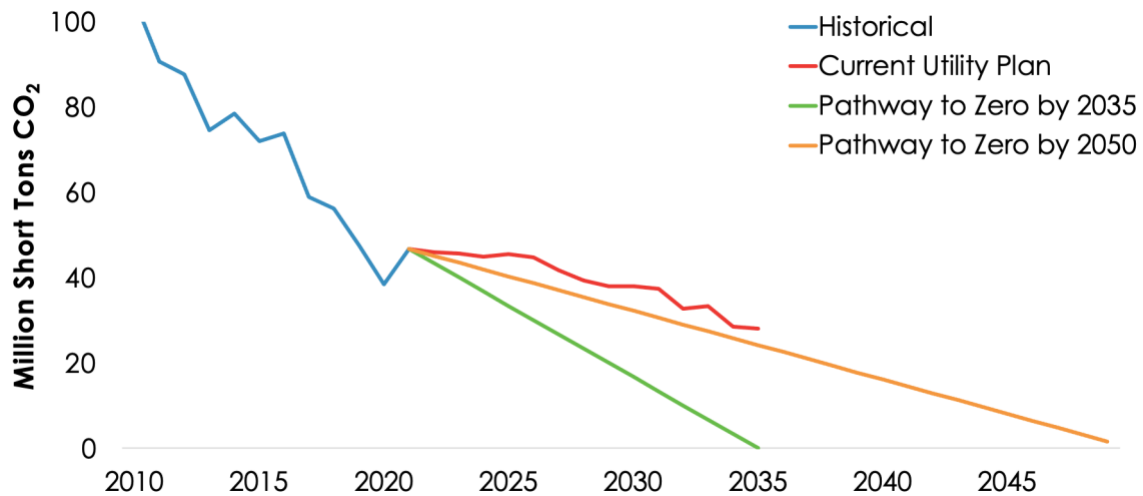
Utility Name	Resource Mix (% of Power)				Carbon Dioxide (CO ₂)			
	Energy Type	2010	2021	2030	Metric	2010	2021	2030
NextEra/FPL ²	Fossil Fuels	80%	72%	57%	Million Tons	62	46	35
	Solar & Wind	<1%	6%	24%	Lbs/MWh	995	689	457

² Historical figures for Southern Company do not include historical data for Gulf Power, which was sold to NextEra.

TENNESSEE VALLEY AUTHORITY

The Tennessee Valley Authority (TVA) has the largest planned new-gas build out of any utility in the country. While TVA has committed to retiring its coal plants by 2035, to date it has proposed to replace those coal plants with new gas power plants and pipelines. A combination of flat load growth and new nuclear generation has led TVA to have one of the steepest emission reduction trajectories from 2010 through today. That makes TVA’s planned trajectory all the more concerning. In one of the most dramatic shifts from steep decarbonization to slow decarbonization, TVA’s current trajectory means it is unlikely to decarbonize by 2050 let alone 2035. TVA has just begun its latest IRP, and with IRP cycles only every five years, this 2024 TVA IRP is critical if TVA is going to align its future resource plan with decarbonization at a pace that will truly address the climate crisis.

TVA PLANS VS. PATHWAYS TO ZERO



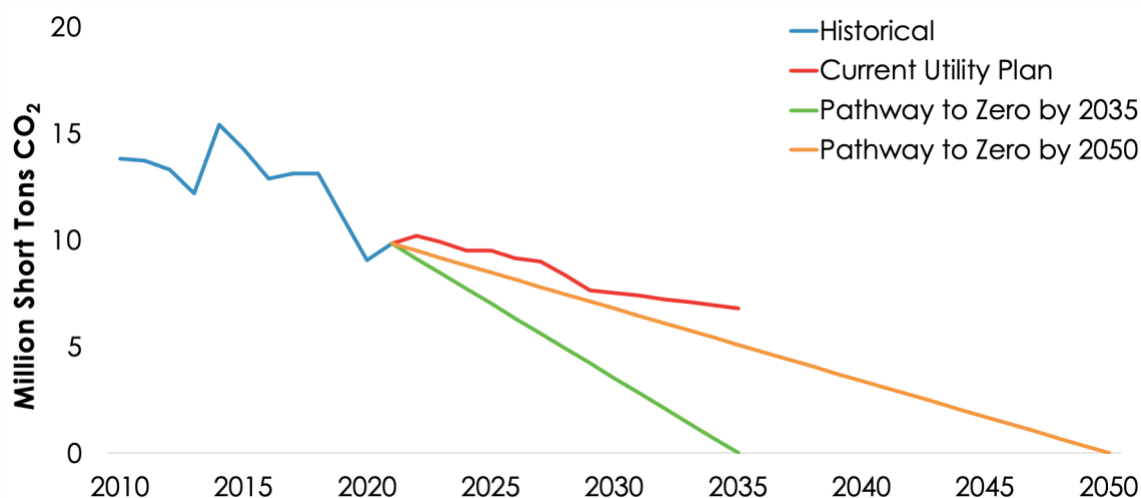
TVA’s reliance on fossil fuels is expected to remain unchanged between now and 2030 despite several large coal retirements, as TVA replaces that coal nearly one-for-one with gas. While solar increases under TVA’s current plan, TVA’s current level and projection for 2030 based on its current plans and announcements are still lower than most other utilities in the region. TVA saw a significant drop in emissions intensity from 2010 to 2021, largely due to bringing the Watts Bar nuclear unit online. TVA’s change in emission intensity from 2021 through 2030 is expected to be smaller than other utilities in the region, though it is expected that TVA’s emission intensity will remain one of the lowest in the region.

Utility Name	Resource Mix (% of Power)				Carbon Dioxide (CO ₂)			
	Energy Type	2010	2021	2030	Metric	2010	2021	2030
TVA	Fossil Fuels	61%	43%	43%	Million Tons	105	47	38
	Solar & Wind	<1%	3%	8%	Lbs/MWh	1,182	585	442

DOMINION ENERGY SOUTH CAROLINA

Dominion Energy South Carolina, DESC, is undergoing an IRP process in 2023 that, until finalized, has not been fully captured in this analysis.³ While the utility has seen some improvements to its near-term trajectory since our last report, it remains *off-track* from a decarbonization by 2050. Dominion, like other utilities in the region, is proposing to lock in new fossil gas resources, which hampers its ability to reduce emissions at the pace needed to achieve zero by 2050. Dominion is projected to increase its solar generation, which is a main driver of the projected emission reductions between 2022 and 2030.

DOMINION ENERGY SC PLANS VS. PATHWAYS TO ZERO



DESC, like other utilities in the region, has largely replaced coal with gas over the past decade. With further plans for new gas, and despite an expected increase in solar generation, DESC's emission intensity will remain on the higher end of utility parent companies in the region.

Utility Name	Resource Mix (% of Power)				Carbon Dioxide (CO ₂)			
	Energy Type	2010	2021	2030	Metric	2010	2021	2030
Dominion Energy	Fossil Fuels	62%	69%	54%	Million Tons	14	10	8
	Solar & Wind	<1%	9%	22%	Lbs/MWh	1,146	869	640

³ The South Carolina PSC will hold a hearing on DESC's 2023 IRP in late August, and decide whether to approve, reject, or ask for modifications after that.

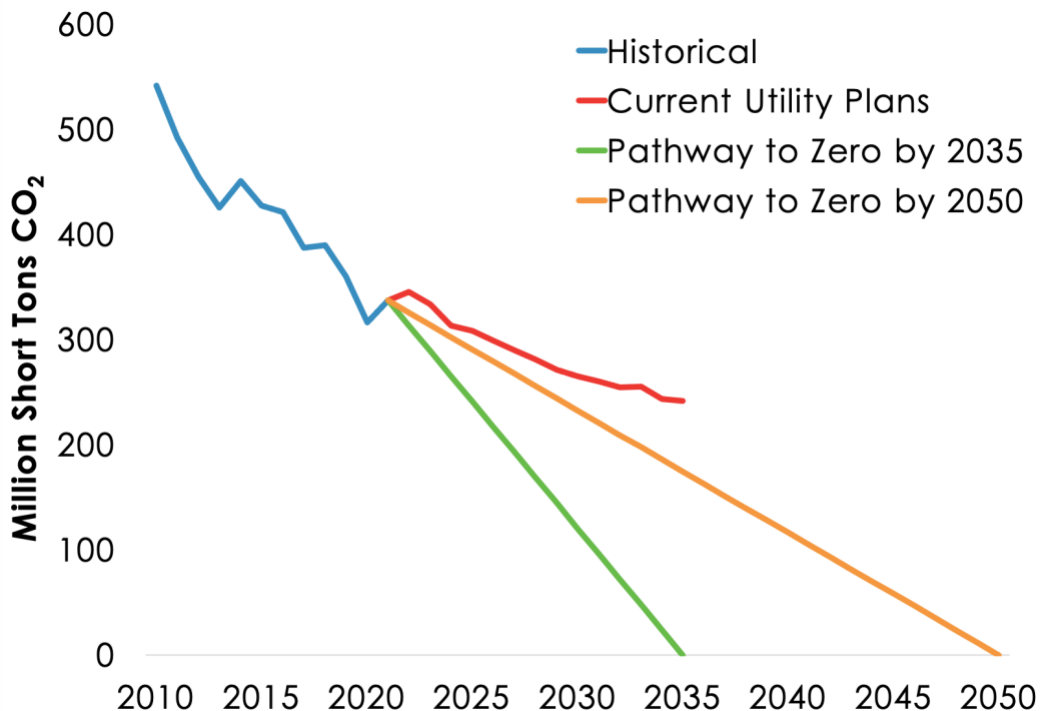
REGION: STILL OFF TRACK

Scientific guidance calls us to limit global temperature rise to 1.5°C to avoid the worst of the climate crisis. The Biden Administration has a stated goal for the power sector to be carbon-free by 2035 in order to accommodate the decarbonization of other sectors. Many Southeast utilities have announced goals to be net-zero carbon by 2050; NextEra has announced a “Real Zero” goal by 2045.

GLOBAL GREENHOUSE GAS EMISSIONS *MUST*
PEAK BY 2025,
DECLINE RAPIDLY, AND
REACH NET-ZERO BY 2050
TO LIMIT GLOBAL TEMPERATURE RISE TO 1.5°C.

~IPCC WGIII AR6 REPORT, APRIL 2022

CURRENT SOUTHEAST UTILITY PLANS VS. NET-ZERO PATHWAYS

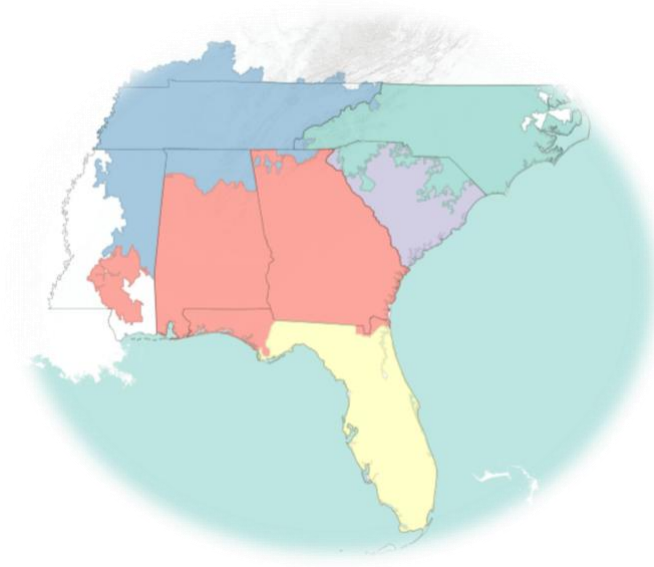


Unless utilities change current plans, the Southeast will not be able to join together with the rest of the world in addressing the climate crisis.

APPENDICES

APPENDIX A: GEOGRAPHIC COVERAGE

The geographic coverage of data encompasses Southeastern utilities outside of the PJM/MISO regions. The states of Alabama, Florida, Georgia, and South Carolina are fully covered; relatively small portions of the North Carolina and Tennessee are served by utilities that participate in PJM (thus while statewide reports for these states are relatively comprehensive, they may not align exactly with other data sources); only portions of Mississippi and Kentucky that are parts of TVA or the Southern Planning Area are included.



APPENDIX B: DATA SOURCES, METHODS, AND ASSUMPTIONS

DATA SOURCES

U.S. Energy Information Administration (EIA) - the primary source for Southeastern generation, capacity, and fuel type for plants and units are reported directly by utilities in the following:

- Forms EIA 860 (Annual Electric Generator Data)
- EIA 861 (Annual Electric Power Industry Report)
- EIA 923 (Annual Electric Utility Data)

Utility integrated resource plans (IRPs) – EIA data is supplemented by public domain sources, including utility resource plans, utility press releases, guidance documents, and the judgment of SACE staff.

Federal Energy Regulatory Commission (FERC) – Generation and peak demand forecasts are obtained from FERC 714 (Annual Electric Balancing Authority Area and Planning Area Report).

METHODS

The Southeastern baseline generation forecast used in this report includes historic and forecast information related to over 3,500 generators located at over 1,400 plants in the Southeast (or specifically identified as serving load in the Southeast) through 2035. Also included is forecast information related to generation anticipated by utilities through 2035 that has not been sited at a specific plant.

Generation is matched to load based on SACE's research into plant ownership, firm contracts, utility power sharing agreements, and judgement of staff experts regarding short-term bilateral market activity. The matching of generation to load allows SACE to estimate the actual mix of generation serving a utility's load, taking into account imports or exports, as necessary. Thus, generation and emission estimates in this report are not usually equal to the utility's owned and operated generation. Emissions are presented in short tons and calculated based on fuel use and Environmental Protection Agency (EPA) guidance on CO₂ emissions computation.

The annual net generation of each unit (or portions of a unit) is assigned to load-serving utilities, "trading" unit assignment between utilities to result in a balanced system; all demand is met by a collection of portions of generating units, having allocated generation proportionally to the percent of the unit assigned to that utility for that year.

ADDITIONAL RESOURCES FROM SACE

The Southern Alliance for Clean Energy (SACE) releases annual reports covering clean energy and transportation topics in the Southeast. We invite you to [view all of our reports, white papers, and other technical resources](#) and select reports below.

[Energy Efficiency in the Southeast, Fifth Annual Report. \(2023\)](#)

[Transportation Electrification in the Southeast, Third Annual Report. \(2022\)](#)

[Solar in the Southeast, Sixth Annual Report. \(2023\)](#)

