

TRACKING DECARBONIZATION IN THE SOUTHEAST

GENERATION + CO₂ EMISSIONS REPORT

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INTRODUCTION

The scientific guidance to avoid the worst impacts of the climate crisis is to limit warming to 1.5 degrees Celsius, which can be done by reducing global greenhouse gas emissions to net-zero between 2040 and 2055. While emissions reduction opportunities exist all over the world and in many different sectors, this report will discuss decarbonizing the electric power sector of the Southeastern United States.

Several electric utilities in the region have set long-term goals to reduce carbon dioxide (CO₂) emissions. Solar is being deployed at increasing scale, utilities say they are investing in energy efficiency, and developers are moving to build offshore wind farms ...but will it be too little too late?

To answer this question, SACE has compiled historical data for the past decade, and utility resource plans, called IRPs, that utilities are required to file by state law. To inform regulatory advocacy, generation and emissions figures in this report are tied to the utility or state where the power is consumed, and not where it is generated or emitted.

The purpose of this report is to review emissions and generation trends of the electric power sector in the Southeast. We will identify what utility resource plans (IRPs) tell us about the region's resource mix, future carbon emissions, and the rate of decarbonization.

ABOUT SACE

The Southern Alliance for Clean Energy (SACE) 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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EXECUTIVE SUMMARY

Changes in power generation have driven CO₂ emissions from electric utilities in the Southeast down for over a decade. Despite deployment of new solar generation and ample energy efficiency potential, emissions flatten out under current utility plans. This falls far short of the trajectories recommended to avoid the worst of the climate crisis, prompting several questions and observations:

UTILITIES AGREE TO DECARBONIZE, THEN DELAY

A growing number of electric utilities and cities in the Southeast have set goals to decarbonize by transitioning from fossil fuels to sources that emit lower or no CO₂ emissions. Duke Energy and Southern Company have long-term net-zero goals, but other large utilities like NextEra and the Tennessee Valley Authority (TVA) have either short-term or no formal goals.

However, none of these four utilities' resource plans will result in reductions that help them reach zero carbon by 2050. Setting a goal is not enough, and utilities should not delay on pursuing clean energy in resource planning.

EVERY YEAR MATTERS AND EVERY CHOICE MATTERS

The direct emissions of fossil gas combustion is roughly half of that of coal. Replacing coal with gas has driven down power sector CO₂ emissions, but the potential for further reductions from this strategy are now small since the Southeast average CO₂ per MWh has reached the average of fossil gas plants. This strategy also ignores greenhouse gases emitted through gas production.

It is now time to move to replace *all* fossil fuel use with carbon-free clean energy technologies like renewable energy and energy efficiency. Sadly, utilities plan to further increase the region's reliance on fossil gas, delaying full decarbonization.

DECARBONIZATION THROUGH ELECTRIFICATION

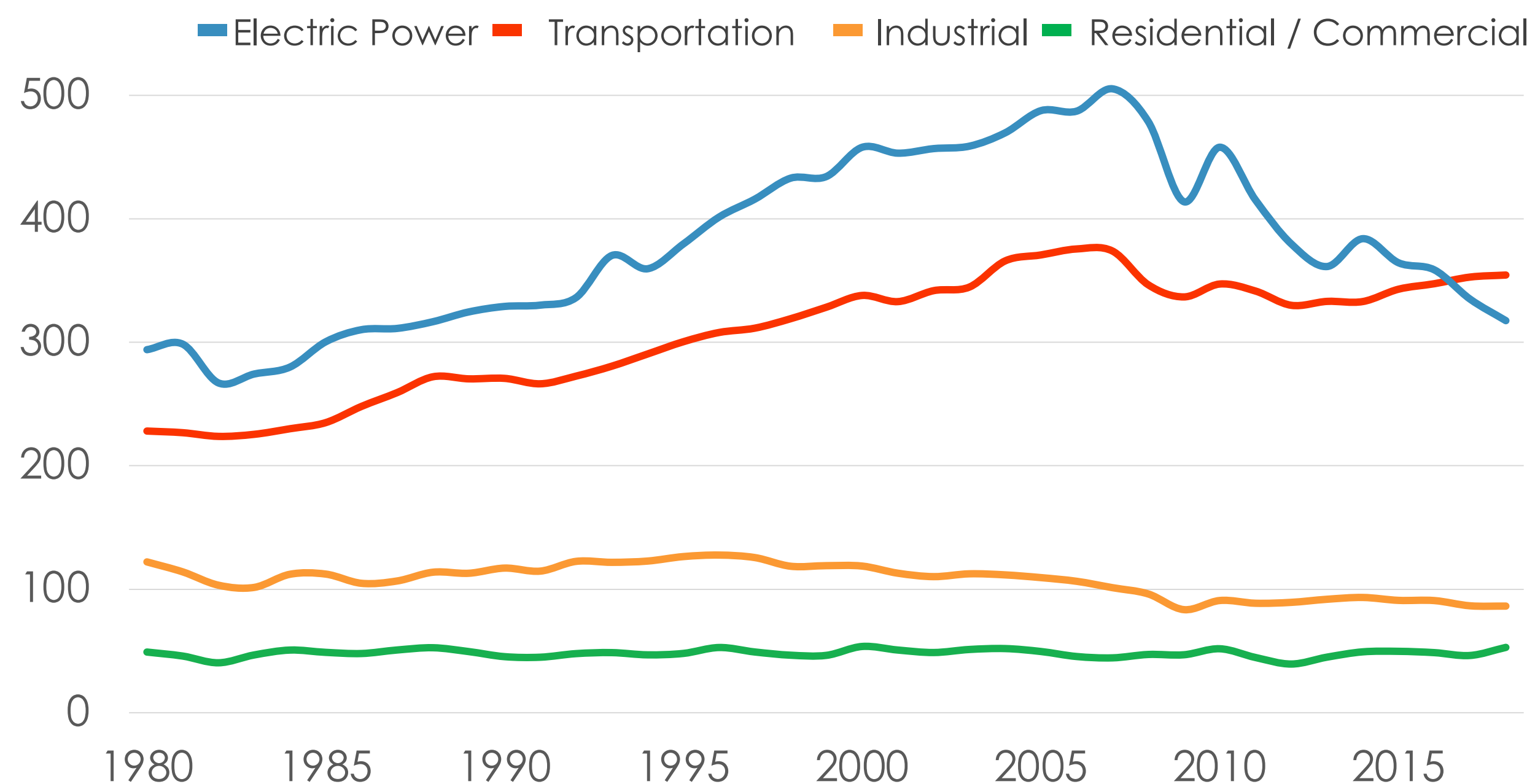
The Biden Administration has a stated goal of a carbon-free power sector by 2035. Potential policies include a federal Clean Energy Standard, which could have an outsized impact on the electricity fuel mix in the region, or using Congressional oversight to ensure rapid decarbonization of the region's federally-owned TVA.

Decarbonization of the power sector is a critical tool to reduce emissions in *all* sectors through electrification. The most prominent opportunity is to electrify the transportation sector, which has been included in recent legislative efforts around infrastructure.

SOUTHEAST EMISSIONS IN CONTEXT

CO₂ emissions can be reported by sector to measure how consumption of fossil fuels, such as coal, fossil gas, and oil, contributes to greenhouse gas emissions. On a national and regional level, reported annual CO₂ emissions have been dropping. The primary driver for this decrease is observed in sharply falling emissions **the electric power sector, which is the focus of this report**. Another notable result of the power sector's decrease from its peak in 2007 is that the transportation sector recently surpassed it as the largest regional source of CO₂. Southeastern states made up 16% of all U.S. CO₂ emissions in 2018, the most recent year for state level data by sector, but the region accounted for nearly 20% of emissions in the electric power sector.

SOUTHEAST CO₂ EMISSIONS BY SECTOR

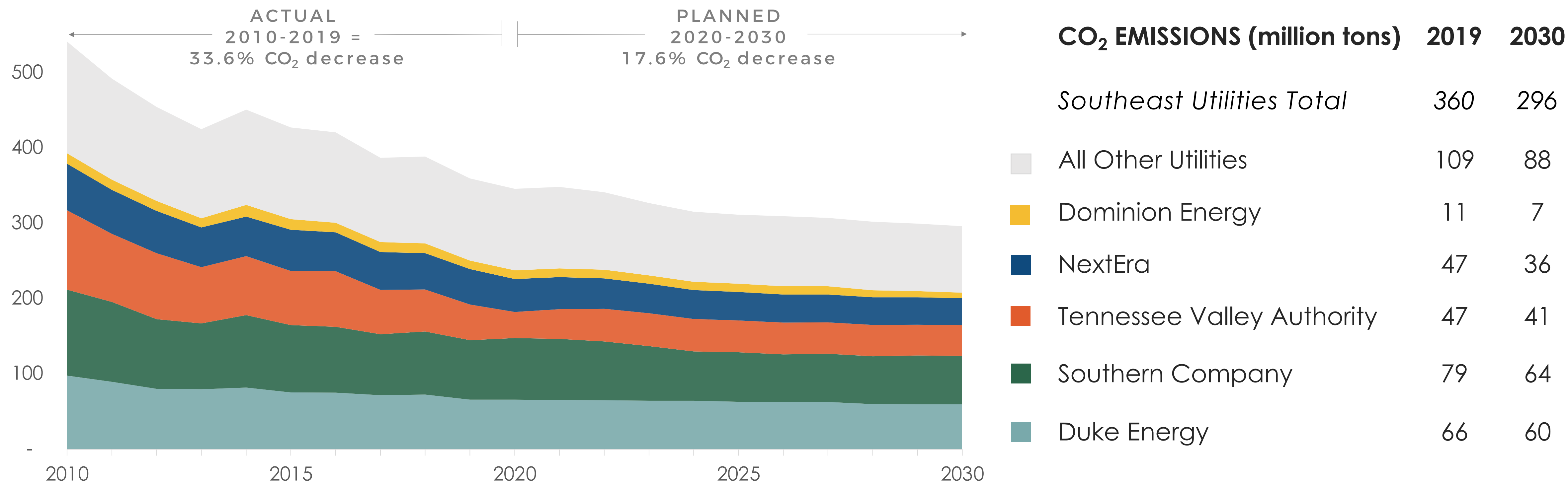


U.S. CO₂ EMISSIONS SUMMARY BY REGION

| CO ₂ in 2018 | Million Tons | % of U.S. Total | Per Capita |
|-------------------------|----------------|-----------------|-------------|
| Northeast | 644.0 | 12.2% | 11.5 |
| Midwest | 1,363.5 | 25.8% | 20.0 |
| South Region | 2,307.5 | 43.6% | 18.5 |
| Southeast | 836.0 | 15.8% | 13.5 |
| West Region | 972.3 | 18.4% | 12.5 |
| U.S. Total | 5,287.3 | 100% | 16.2 |

*Southeast grouping covers AL, FL, GA, MS, NC, SC, TN. Regions are Census regions. Data: U.S. Energy Information Administration (EIA) – [State CO₂ Emissions](https://www.eia.gov/state/).

EMISSIONS FORECAST FOR UTILITIES



Total Southeast emissions are expected to fall 18% from current levels by 2030, just under half the reductions in the past decade. Most of those reduction will occur over the next three-four years with little or no action after that. Two utility systems that have made net-zero pledges, **Duke Energy and Southern Company**, represent 40% of total carbon emissions in the region. However, most reductions expected from these utilities arise from decisions made *before* decarbonization goals had been set. **NextEra and TVA** have both referenced expected reductions in the per megawatt emissions rate in press releases, though these statements fall short of true commitments to decarbonization.

EMISSIONS REDUCTIONS FOR UTILITIES

CO₂ EMISSION RATE REDUCTION TRENDS

| Utility Group | Average Annual CO ₂ Reduction | | Estimated Year to Zero | |
|------------------|--|------------------------|------------------------|-------------------|
| | 2010-2019 (Actual) | 2020-2030 (Planned) | 2010-2019 Pace | 2020-2030 Pace |
| Duke Energy | -4.2% | -0.9% | 2054 | Past 2100 |
| Southern Company | -3.8% | -1.8% | 2056 | 2086 |
| TVA | -8.2% | -0.8% | 2042 | Past 2100 |
| NextEra | -2.9% | -2.5% | 2064 | 2071 |
| Dominion SC | -1.8% | -3.5% | 2084 | 2058 |

***EVERY BIT
OF WARMING MATTERS***

EVERY YEAR MATTERS

EVERY CHOICE MATTERS

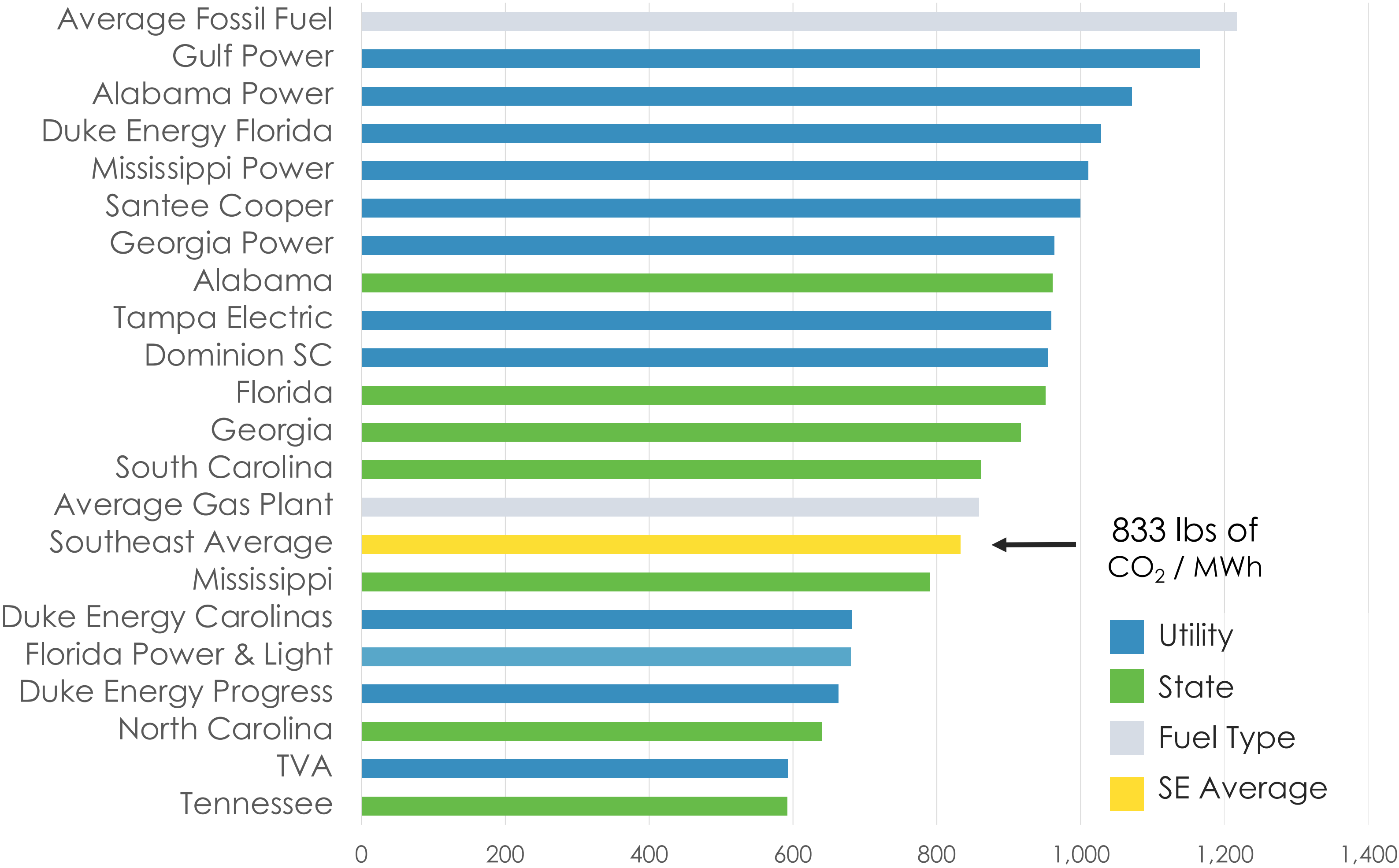
***- FORWARD TO IPCC SPECIAL
REPORT, OCTOBER 2018***

One way to track decarbonization is to look at emission reduction trends over time increments, so there is less emphasis on annual ups and downs. Most utilities were reducing carbon at a higher rate in the last decade than they plan to do in the coming decade. This is because most emission reductions from 2010-2019 were the result of flat or declining utility load, paired with retiring coal generation and replacing it with fossil gas.

Fossil gas is now the dominant fuel in the region, so for utilities to decarbonize at the pace seen in the 2010s they will have to **retire remaining coal plants at a steady pace and replace fossil gas with clean, zero-carbon energy sources like wind, solar, storage, and energy efficiency.**

EMISSIONS CO₂ INTENSITY OF POWER SUPPLY⁸

CO₂ EMISSIONS INTENSITY IN 2019 (lbs of CO₂/MWh)



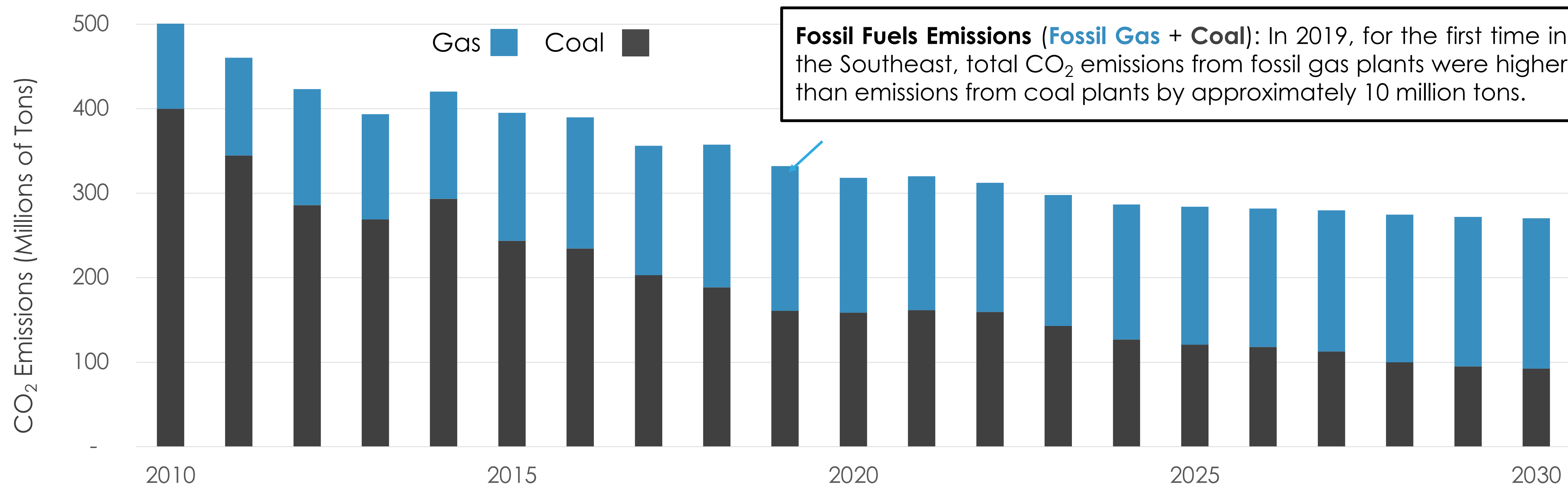
SOUTHEAST GAS RELIANCE DRIVES EMISSION RATE

Another measure of decarbonization is the **carbon intensity** of the power supply. When consumed, different fuels emit different amounts of carbon for each megawatt hour (MWh) of electricity produced. Lower emissions intensity results in less polluting emissions.

Southeast utilities range from around 600 lbs / MWh, to nearly double that in the case of Gulf Power at 1,165 lbs / MWh. In 2019, the average for Southeast utilities was 832 lbs / MWh (a decrease from the regional average of 890 in the previous year) keeping pace with the amount a fossil gas plant emits using the same measure.

While instructive for comparing utilities and states, the per megawatt CO₂ rate can be an incomplete measure when utilities do not have total reduction targets in place. Even relatively low-emitting utilities can contribute a lot to emissions if they are burning a lot of fossil gas.

FOSSIL FUEL EMISSIONS TRENDS



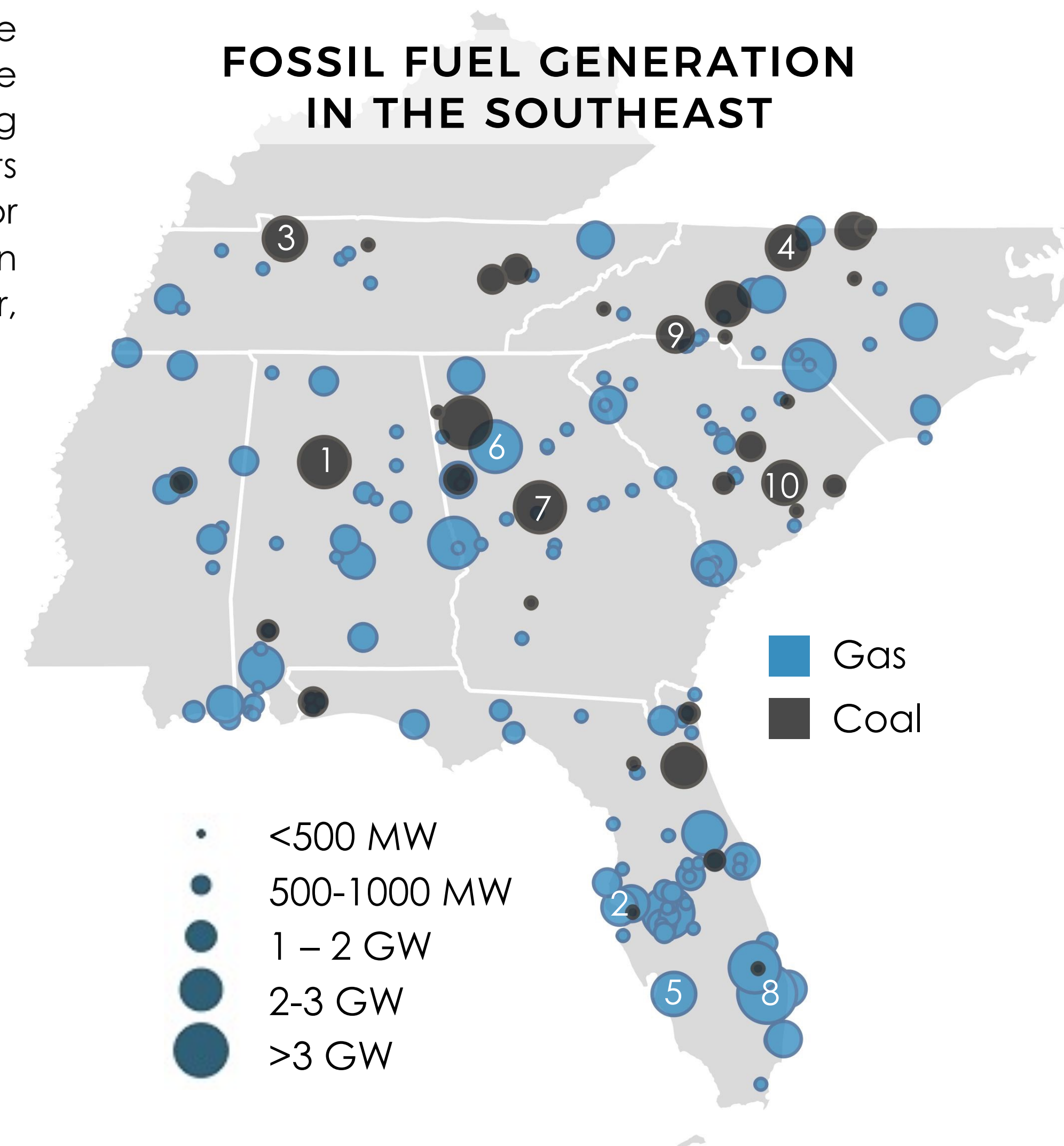
While coal retirements have driven regional CO₂ downwards over the past decade, **current utility plans show that the impact of the few remaining retirements will be hindered by rising fossil gas consumption.** Furthermore, about a quarter of the expected emissions from new gas generation come from utilities with net-zero goals, such as Duke, Dominion, and Southern Company. The above chart only measures emissions from the combustion of fossil gas, but there are further emissions associated with its production, transmission, and distribution. Many utility decarbonization strategies fail to account for these additional emissions, but it can add up to 15-30% to the greenhouse gases emitted when combusting gas to generate power, bringing it closer to the average emissions intensity of coal.

EMISSIONS FROM FOSSIL PLANTS

As coal units retire, the oldest and smallest tend to be the first to go, while investments continue to be made in larger coal units. Additionally, larger plants like Scherer sell power to two or even three other utilities across state lines, meaning retirement decisions can be impacted by multiple utility plans. Other coal plants are converted to gas and run more frequently, thus landing several gas-only or gas-majority plants in the top 10 carbon-emitting power plants in the region. In 2030, the top ten fossil plants will represent over 78 million tons of CO₂ per year, approximately one quarter of the region's total expected CO₂ emissions.

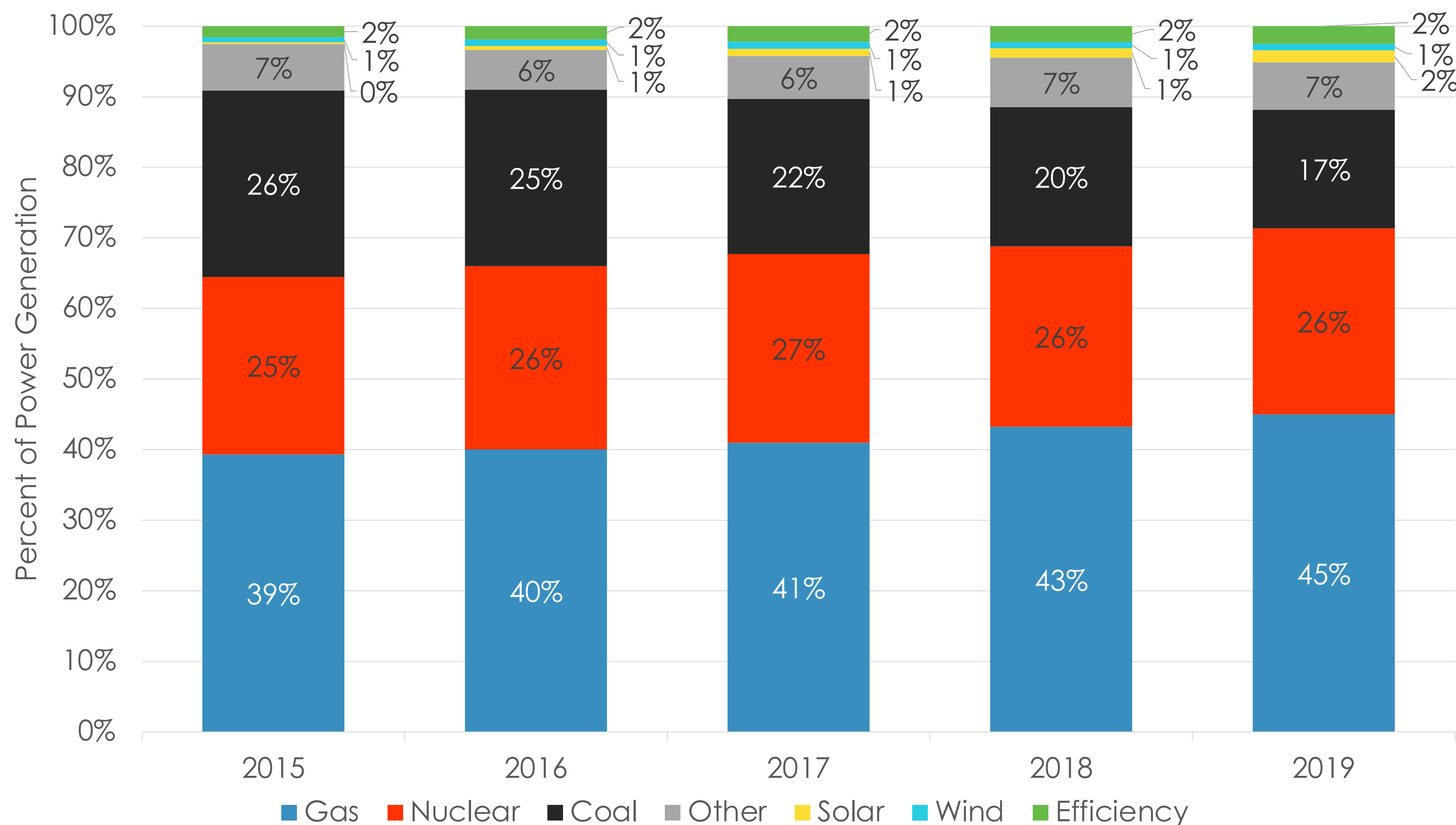
TOP FOSSIL FUEL PLANT BY CO₂ IN 2030

| Rank | Plant Name | State | CO ₂ (m) | CO ₂ / MWh | Fuel |
|------|------------------------|----------------|---------------------|-----------------------|-----------|
| 1 | James Miller Jr | Alabama | 12.1 | 2,180 | Coal |
| 2 | Crystal River | Florida | 11.4 | 1,259 | Coal, Gas |
| 3 | Cumberland | Tennessee | 9.3 | 2,097 | Coal |
| 4 | Belews Creek | North Carolina | 7.2 | 1,893 | Coal |
| 5 | Big Bend | Florida | 7.0 | 1,656 | Gas, Coal |
| 6 | Jack McDonough | Georgia | 6.7 | 811 | Gas |
| 7 | Scherer | Georgia | 6.6 | 2,271 | Coal |
| 8 | West County Energy Ctr | Florida | 6.4 | 818 | Gas |
| 9 | Marshall | North Carolina | 6.3 | 1,940 | Coal |
| 10 | Cross | South Carolina | 5.8 | 2,162 | Coal |



HISTORICAL RESOURCE MIX

PERCENTAGE OF SOUTHEAST GENERATION BY RESOURCE



UTILITY PLANS SHAPE THE RESOURCE MIX

The resource mix, or the combination of resources that provide power, varies from state to state and utility to utility. At a regional level, 90-95% of generation has historically come from fossil gas, coal, and nuclear.

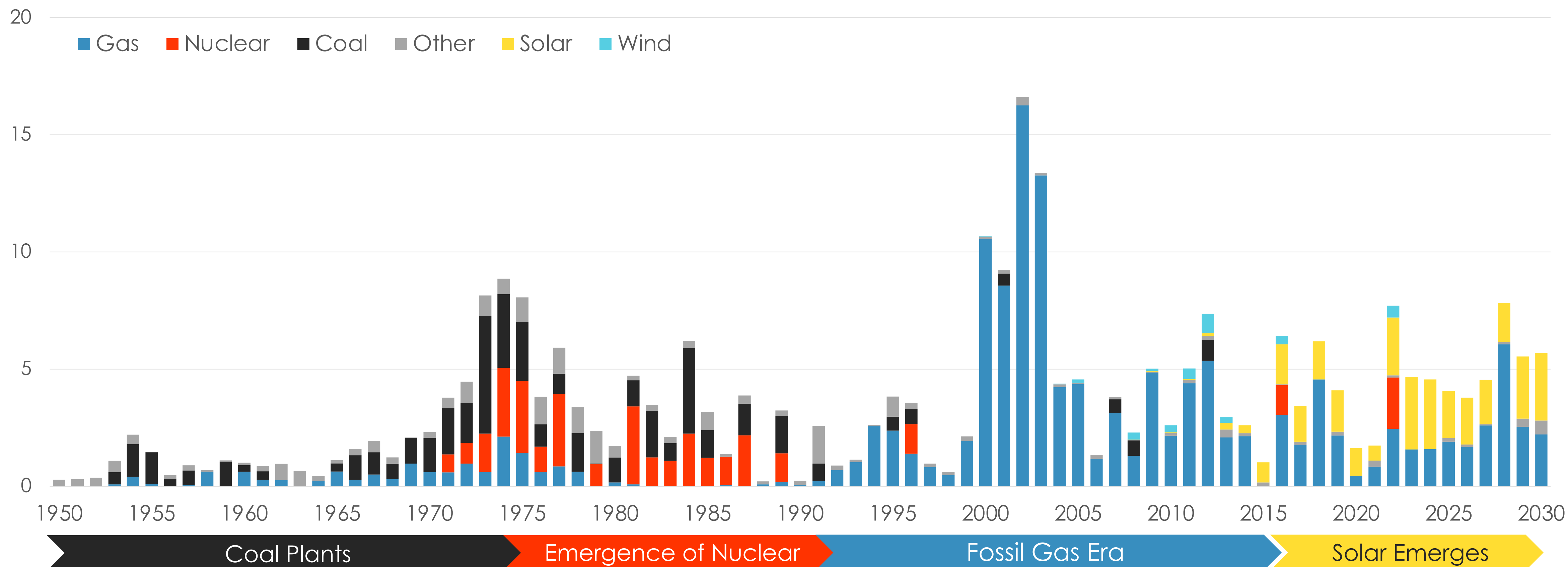
CLEAN ENERGY VERSUS GAS

Fossil gas share of generation continues to grow following the retirement of coal plants, which made up just 17% of the resource mix in 2019.

While the current Southeast resource mix is still majority fossil fuels, clean energy sources (solar, wind, and energy efficiency) have grown to represent 5% of energy in the Southeast. Still, compared to 10% across the U.S, and more in many states, there is still ample room for improvement.

OPERATING & PLANNED CAPACITY BY YEAR BUILT

POWER PLANT CAPACITY (GIGAWATTS)

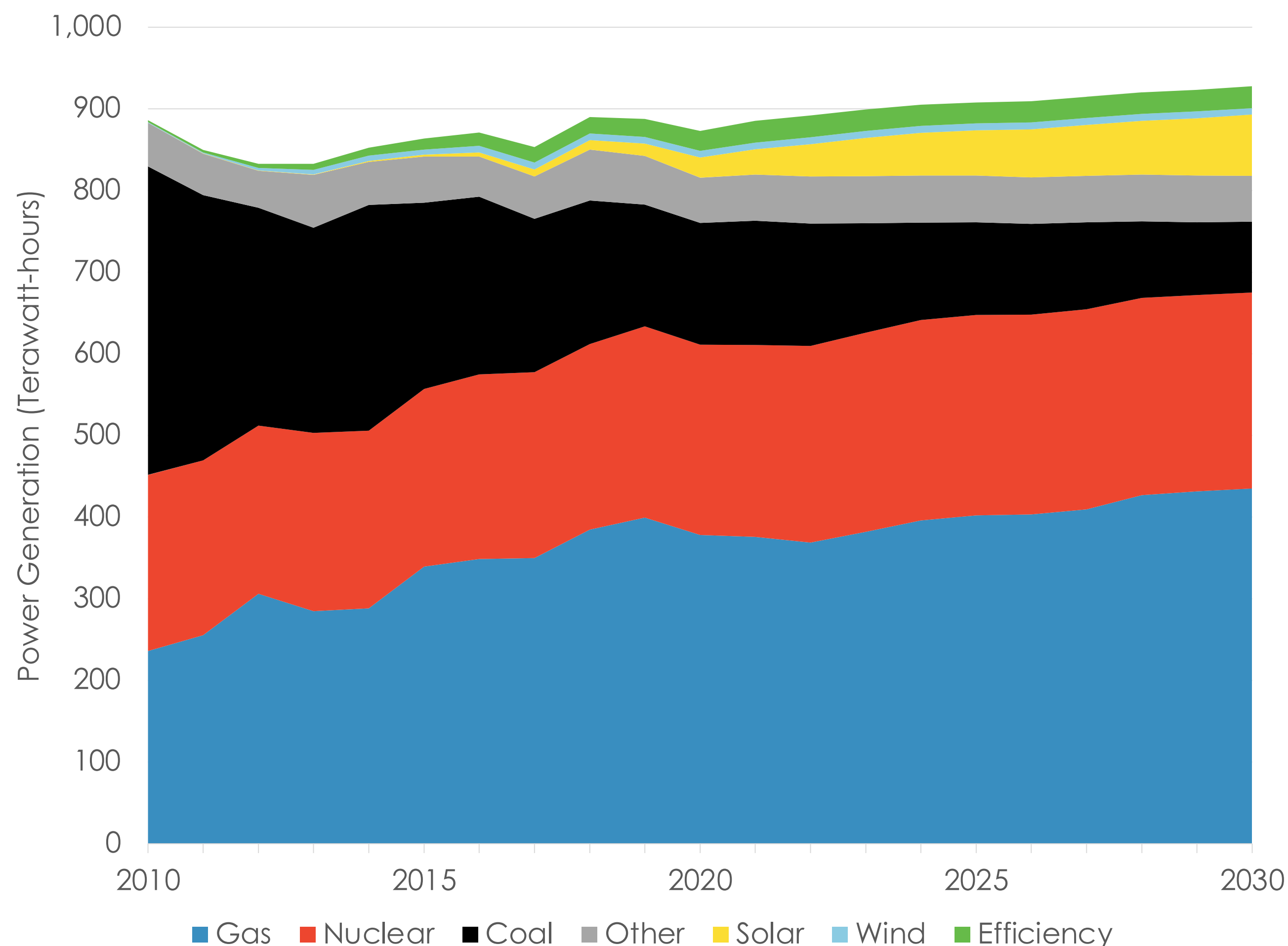


Most gas capacity in the Southeast is old enough that it can complete a typical lifespan inside of a 2035—2050 decarbonization timeframe without stranding a significant number of remaining years, *unless* utilities continue to build new gas capacity.



SOUTHEAST GENERATION FORECAST

SOUTHEAST GENERATION BY FUEL TYPE, 2010-2030



UTILITIES PROPOSE NEW POWER PLANTS

Fossil gas is on track to fuel nearly half of the region's total electric generation in the next few years. Utilities such as Duke and Southern Company have falsely cited new customers and load growth as a justification for building new power plants, despite the fact that energy efficiency would be a more suitable choice to meet the needs of new residents moving into the service territory.

STILL WAITING FOR COAL TO VANISH

While current plans include continued significant use of coal through *at least* 2030, individual utilities such as Duke Energy have said they intend to retire remaining coal generation during that timeframe...but this has yet to show up in utility plans.

READY FOR TAKEOFF?

Utility investment in solar shows no sign of slowing, with solar making significant additions each year until 2030. Future forecast updates may reflect new opportunities for wind as utilities evaluate in-region and offshore resources.

ELECTRIC UTILITY CARBON GOALS

DECARBONIZATION FACES MANY CHALLENGES

Even where decarbonization goals have been set, there can be challenges to realizing these goals and reduction emissions at rates needed to address the climate crisis. **Namely, there is often inconsistencies between goals and plans.** Public facing goals may not have an impact if they are not also adopted internally. For example, in 2019 Southern Company's low-to-no carbon goal was the most forward-looking posture by a major Southeastern utility, but its Georgia subsidiary told regulators that it did not take this goal into account in its power supply plan, which is why utility IRPs are key to tracking decarbonization. Duke's utilities in the Carolinas included emissions reduction trajectories as scenarios in the 2020 IRPs.

And while some utilities have publicized ambitious-sounding figures on expected emissions reductions, these do not rise to the level of firm commitments to decarbonize. Common issues include leaving out key long-term 2040-2055 goal time frames, or they do not aim to reduce total carbon emissions. Below is a table of where major utilities in the Southeast stand:

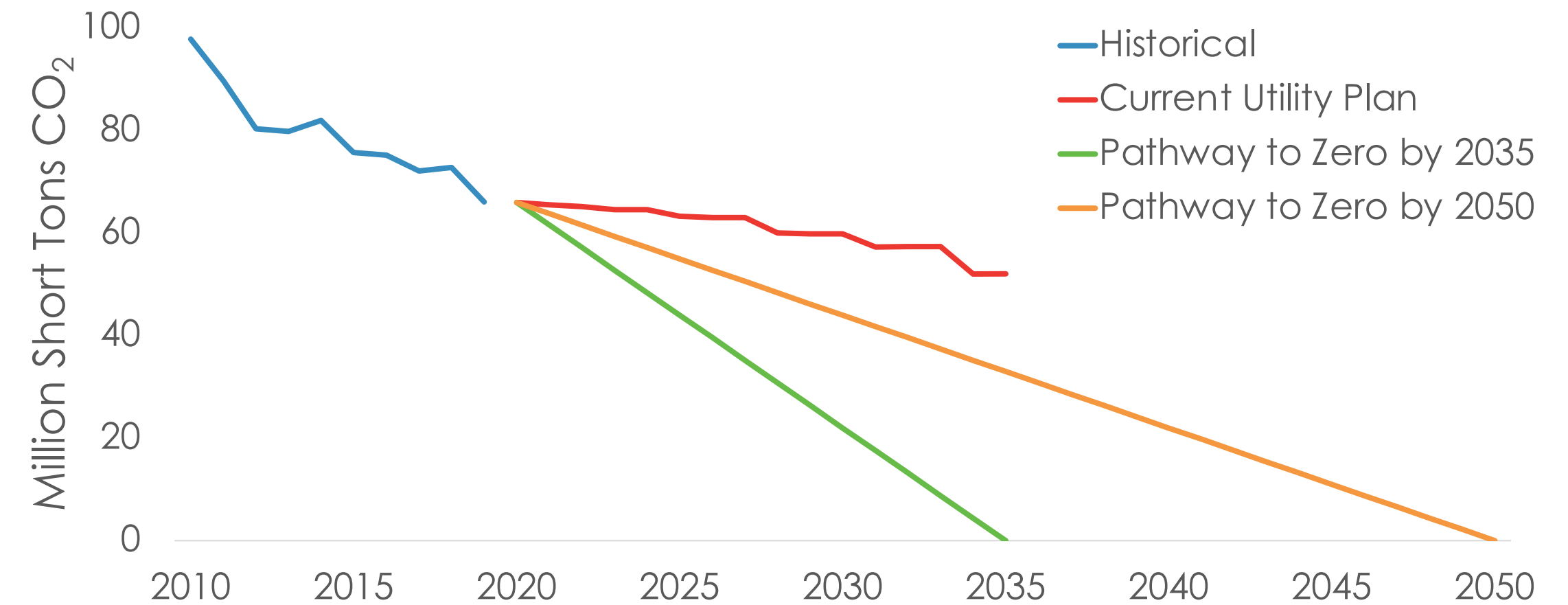
| Utility Group | Publicized Reductions | Announced Goal | Zero or Net-Zero Goal | Scenario in IRP | On Track to Decarbonize by 2050 | Years to Zero at 2020-2030 Pace |
|----------------------------|-----------------------|----------------|-----------------------|-----------------|---------------------------------|---------------------------------|
| Duke Energy | Yes | Yes | Yes | Yes | No | Past 2100 |
| Southern Company | Yes | Yes | Yes | No | No | 2086 |
| Dominion SC | Yes | Yes | Yes | No | No | 2058 |
| NextEra Energy | Yes | Yes | No | No | No | 2071 |
| Tennessee Valley Authority | Yes | No | No | No | No | Past 2100 |

DUKE ENERGY

DUKE OFF-TRACK

Duke's resource plans in Florida and the Carolinas do not align with the Biden Administration's stated goal to have the electric sector carbon-free by 2035. Duke's utilities in the Southeast are not even on track to be carbon-free by their own goal of 2050, largely due to a slow-down in emissions reductions over the 2020-2030 timeframe. If Duke's plans for the next decade were to return to the pace of decarbonization during 2010-2019, it would be in a better position to reach zero by 2050.

DUKE ENERGY PLANS VS. PATHWAYS TO ZERO



| Utility | Total CO ₂ (Million Tons) | | | Lbs of CO ₂ / MWh | | | % Decarb / Year | |
|--|--------------------------------------|------|------|------------------------------|-------|------|-----------------|------------------|
| | 2010 | 2019 | 2030 | 2010 | 2019 | 2030 | 2010-2019 | 2020-2030 |
| Duke Energy | 97.8 | 66.0 | 59.8 | 1,117 | 761 | 638 | -4.2% | -0.9% |
| Duke Energy Carolinas | 40.6 | 29.1 | 28.5 | 965 | 682 | 602 | -3.3% | -0.7% |
| Duke Energy Progress | 27.8 | 15.4 | 8.6 | 1,156 | 663 | 369 | -6.2% | -3.7% |
| Duke Energy Florida | 29.3 | 21.5 | 22.7 | 1,375 | 1,028 | 986 | -3.2% | 0.1% |
| Estimated year utility will approach zero based on decarbonization rate | | | | | | | 2054 | Past 2100 |

DUKE ENERGY

DUKE CORPORATE CARBON REDUCTION GOAL

In 2017, Duke Energy announced a goal to reduce total CO₂ emissions by 40% by 2030, compared to 2005 levels, but bumped this up to 50% in 2019. It also added a net-zero by 2050 long-term goal at the corporate level, and includes Duke's utilities in North and South Carolina and Florida, as well as Kentucky, Indiana, and Ohio. Its Southeastern fleet represents approximately 70-75% of its total CO₂ emissions.

DUKE DIVIDE

Duke's Florida utility lags its Carolinas utilities in planned emission reductions. In early 2021 Duke Energy Florida announced a change to the retirement plan for its largest emitter: the last remaining coal units at the Crystal River power plant. However, accelerating that retirement from the 2040s to 2034 is not enough to make a significant impact on the utility's mid-term carbon reduction trajectory.

Duke's Florida utility also lags its Carolinas utilities in deployment of energy efficiency and solar. Duke's utilities in the Carolinas have historically led the Southeast on energy efficiency savings despite remaining below the national average.

WHAT DUKE IS SAYING...

AS ONE OF THE LARGEST INVESTOR-OWNED UTILITIES IN THE U.S., [DUKE ENERGY'S] GOAL TO ATTAIN A NET-ZERO CARBON FUTURE REPRESENTS ONE OF THE MOST SIGNIFICANT REDUCTIONS IN CO₂ EMISSIONS IN THE U.S. POWER SECTOR.

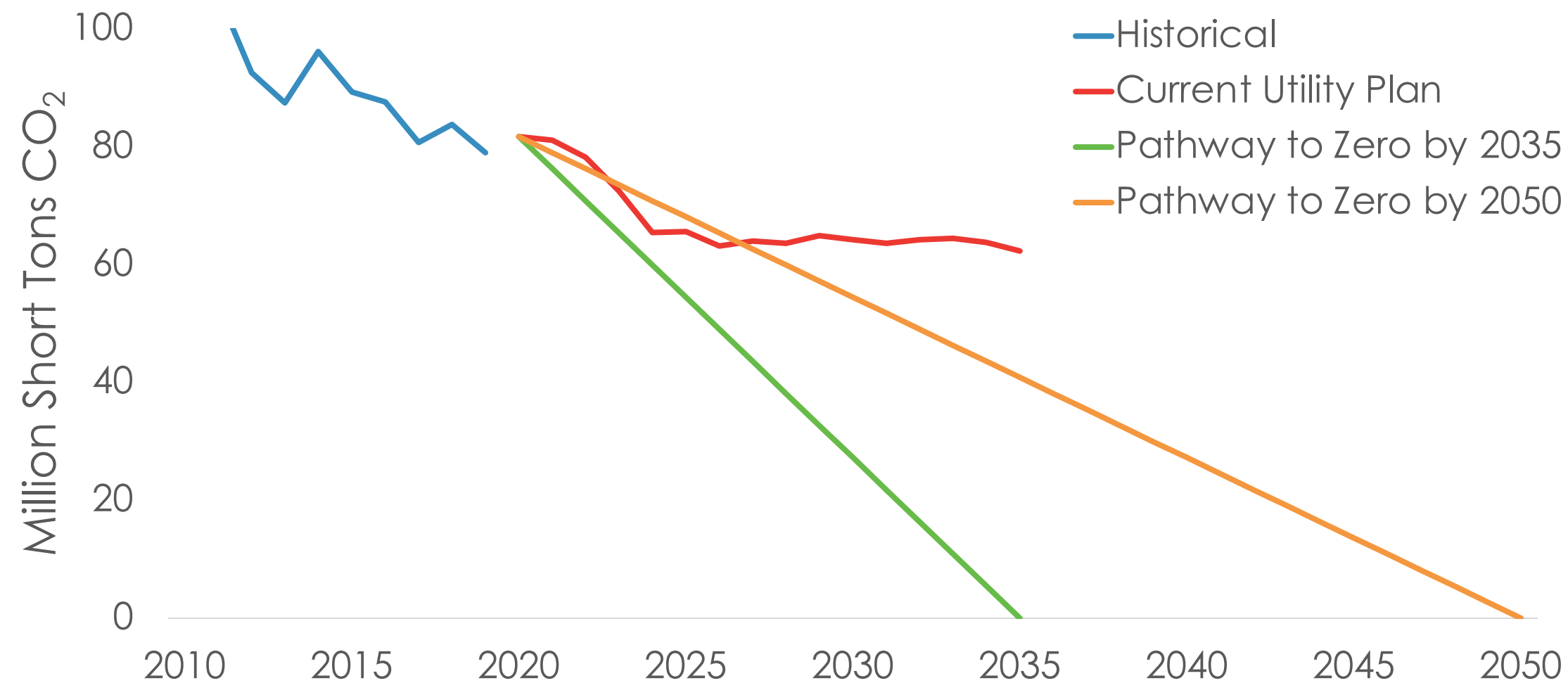
~DUKE ENERGY CAROLINAS IRP, SEPTEMBER 2020

WHAT DUKE IS DOING

In September 2020, Duke released IRPs for its two utilities in the Carolinas. These IRPs are an opportunity for Duke to show leadership on decarbonization, an opportunity Duke largely missed, instead opting for a false choice between retiring coal and building new fossil gas, low ambitions on energy efficiency, and delaying solar. Analysis firm Synapse Energy re-did Duke's IRP modeling with more reasonable assumptions and found a reliable clean energy future with significantly lower CO₂ emissions.

SOUTHERN COMPANY

SOUTHERN CO. PLANS VS. PATHWAYS TO ZERO



IS SOUTHERN COMPANY ON TRACK?

Southern Company is on track to meet its interim goal of reduction emissions 50% from 2007 by 2030, but it is not close to being on track to meet its net-zero goal by 2050. Historical reductions have been much sharper than reductions that the collective IRPs will yield over the next decade. However, both fall short of meaningful reductions that would allow the company to reach zero by 2050. In fact, the most recent plans from operating company Mississippi Power actually show a slight increase in emissions in the future,

| Utility | Total CO ₂ (mTons) | | | Lbs of CO ₂ / MWh | | | % Decarb / Year | |
|--|-------------------------------|------|------|------------------------------|-------|-------|-----------------|-------------|
| | 2010 | 2019 | 2030 | 2010 | 2019 | 2030 | 2010-2019 | 2019-2030 |
| Southern Company | 114.3 | 79.0 | 64.2 | 1,409 | 1,006 | 814 | -3.8% | -1.8% |
| Georgia Power | 66.1 | 42.9 | 31.5 | 1,431 | 963 | 703 | -4.3% | -2.3% |
| Mississippi Power | 7.9 | 5.2 | 5.5 | 1,527 | 1,011 | 1,125 | -4.1% | 0.4% |
| Alabama Power | 40.3 | 30.9 | 26.2 | 1,355 | 1,071 | 944 | -2.8% | -1.4% |
| Estimated year utility will approach zero based on decarbonization rate | | | | | | | 2056 | 2086 |

SOUTHERN COMPANY

GOALS ALLOW EMITTING “SOME” CO₂

Southern Company shifted its long-term 2050 goal from “low-to-no” carbon to a “net-zero” approach that will allow the company to “emit some carbon emissions” but “wash out their effects by removing carbon in other ways.” Like Duke, Southern also has an interim goal of reducing CO₂ emissions by 50% from 2007 levels by 2030. Southern Company has also released reports baselining its emissions and updating progress towards its goals, but to date has not modeled decarbonization in a manner consistent with resource plans.

WHAT SOUTHERN COMPANY IS SAYING...

“WE HAVE COMMITTED TO BOTH OUR 2030 AND 2050 GHG REDUCTION GOALS ... WE PURSUE THESE GOALS BECAUSE THEY ARE GOOD FOR THE CUSTOMERS AND COMMUNITIES WE ARE PRIVILEGED TO SERVE. OUR APPROACH IS DRIVEN BY THOUGHTFUL SCENARIO PLANNING, LONG-TERM INTEGRATED RESOURCE PLANS (IRP) AND CONSTRUCTIVE REGULATORY DECISION-MAKING”

~SOUTHERN COMPANY CLIMATE REPORT, SEPTEMBER 2020

WHAT SOUTHERN COMPANY IS DOING

Since establishing the goal, all Southern Company operating companies have completed or begun an IRP cycle. And despite the fact that Southern has claimed its net-zero approach is driven by IRPs, **its operating companies have all failed to address decarbonization in the planning process.** In particular, Georgia Power missed cues from both its parent company and the City of Atlanta, which adopted a 100% clean energy goal. Mississippi Power’s first IRP is underway but contains no references to the net-zero goal.

Using questionable baselines – Southern Company’s 2007 baseline is an all-time high of power sector emissions, making a 50% reduction a relatively low-hanging fruit. And according to annual shareholder reports, Southern Company’s emissions are calculated based on a “financial control” standard, which doesn’t include power purchased from other utilities.

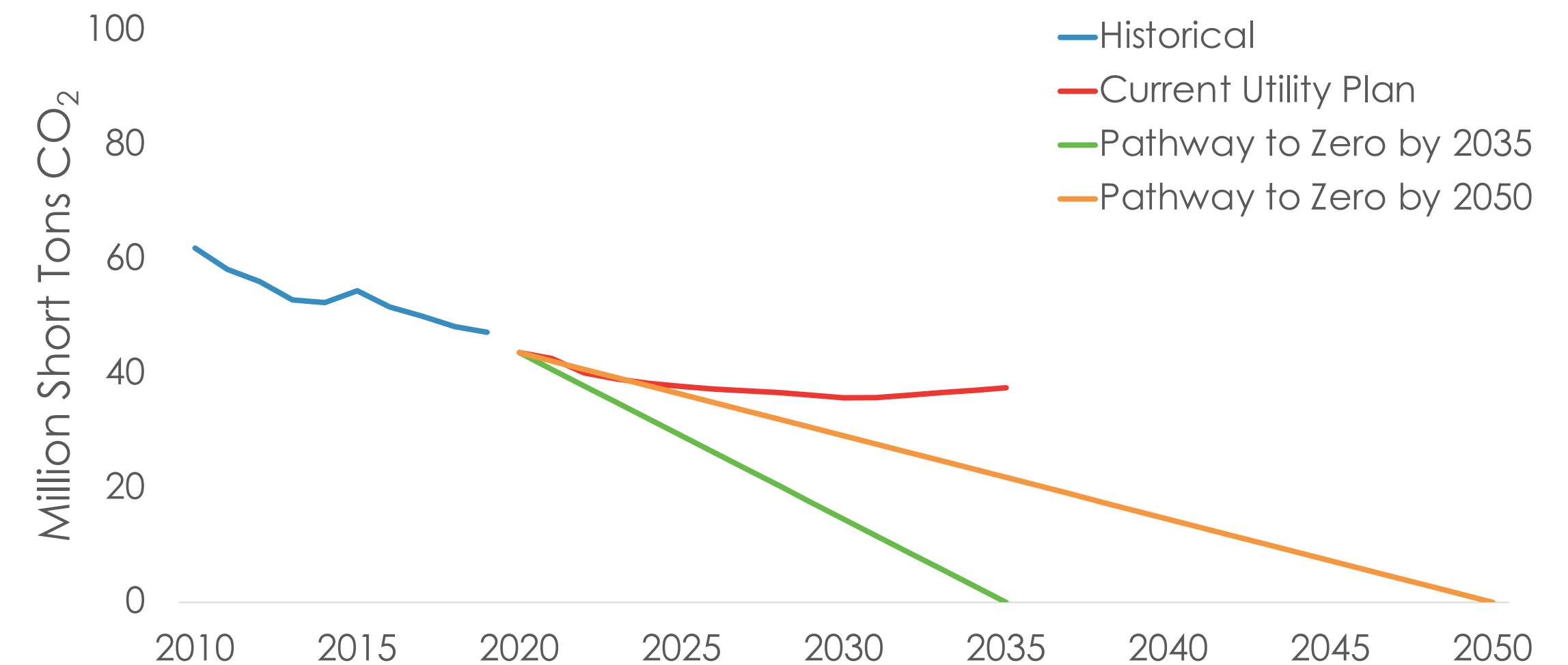
Tracking methane emissions – While Southern Company gets some credit for tracking and reporting fugitive emissions, the best thing for decarbonization would be to electrify instead of patching up only the leakiest of pipelines.

NEXTERA ENERGY

NEXTERA NOT ON TRACK

While NextEra sees steady decarbonization in both operating companies over the next five years in its resource plans, emissions reductions largely flatline after 2025. NextEra may reach its emissions-rate reduction goal, but such a goal has limited usefulness since it does not yield absolute reductions in line with any recommended decarbonization timeframes. Current resource plans are not in line with the Biden Administration's stated goal of a carbon-free electric sector by 2035, nor do they match the timeframe to get to zero by 2050 that other peer companies have adopted.

NEXTERA PLANS VS. PATHWAYS TO ZERO



| Utility | Total CO ₂ (mTons) | | | Lbs of CO ₂ / MWh | | | % Decarb / Year | |
|--|-------------------------------|------|------|------------------------------|-------|------|-----------------|-------------|
| | 2010 | 2019 | 2030 | 2010 | 2019 | 2030 | 2010-2019 | 2019-2030 |
| NextEra Energy | 61.9 | 47.2 | 35.8 | 995 | 724 | 530 | -2.9% | -2.5% |
| Florida Power & Light | 51.2 | 40.4 | 31.6 | 910 | 680 | 511 | -2.5% | -2.2% |
| Gulf Power | 10.8 | 6.8 | 4.2 | 1,777 | 1,166 | 730 | -4.5% | -4.1% |
| Estimated year utility will approach zero based on decarbonization rate | | | | | | | 2064 | 2071 |

NEXTERA ENERGY

NEXTERA CARBON REDUCTION GOAL

NextEra has a short-term goal to reduce its emissions rate (CO₂/MWh) by 67% by 2025 from its 2005 rate, but has yet to set a long-term goal or a target date for when its utilities will be carbon-free. Additionally, NextEra's focus on its emissions rate combined with the fact that it is projecting load growth over the next decade mean that it can actually increase its total annual emissions and still technically reduce its emissions rate.

This is in contrast to the stated policy goals of the American Clean Power Association, of which NextEra is a member, which include clean energy targets that "make tangible progress toward reducing pollution while boosting the economy."

NextEra is well-poised to set a target date for being carbon-free, to determine interim goals for reductions in annual CO₂ emissions, and to align its future resource plans to meet these interim goals.

WHAT NEXTERA IS SAYING...

THERE IS NOT A REGULATED COAL PLANT IN THIS COUNTRY THAT IS ECONOMIC TODAY.

~NEXTERA ENERGY CEO JIM ROBO SPEAKING ON A CONFERENCE CALL WITH ANALYSTS IN JANUARY 2021

WHAT NEXTERA IS DOING

In the Ten-Year Site Plan NextEra released on April 1, 2021 the company plans to retire most remaining coal within the next decade while increasing both fossil gas and solar. NextEra is also planning battery storage projects in both Florida Power & Light and Gulf Power territories, including the large proposed battery storage project at the Manatee Solar facility that is expected to come online by the end of 2021. In addition to the 409 MW of batteries at Manatee, NextEra plans to add over 700 MW of additional battery storage over the next decade. Storage helps to firm intermittent renewables, and is important to increasing the amount of wind and solar on the grid.

TENNESSEE VALLEY AUTHORITY

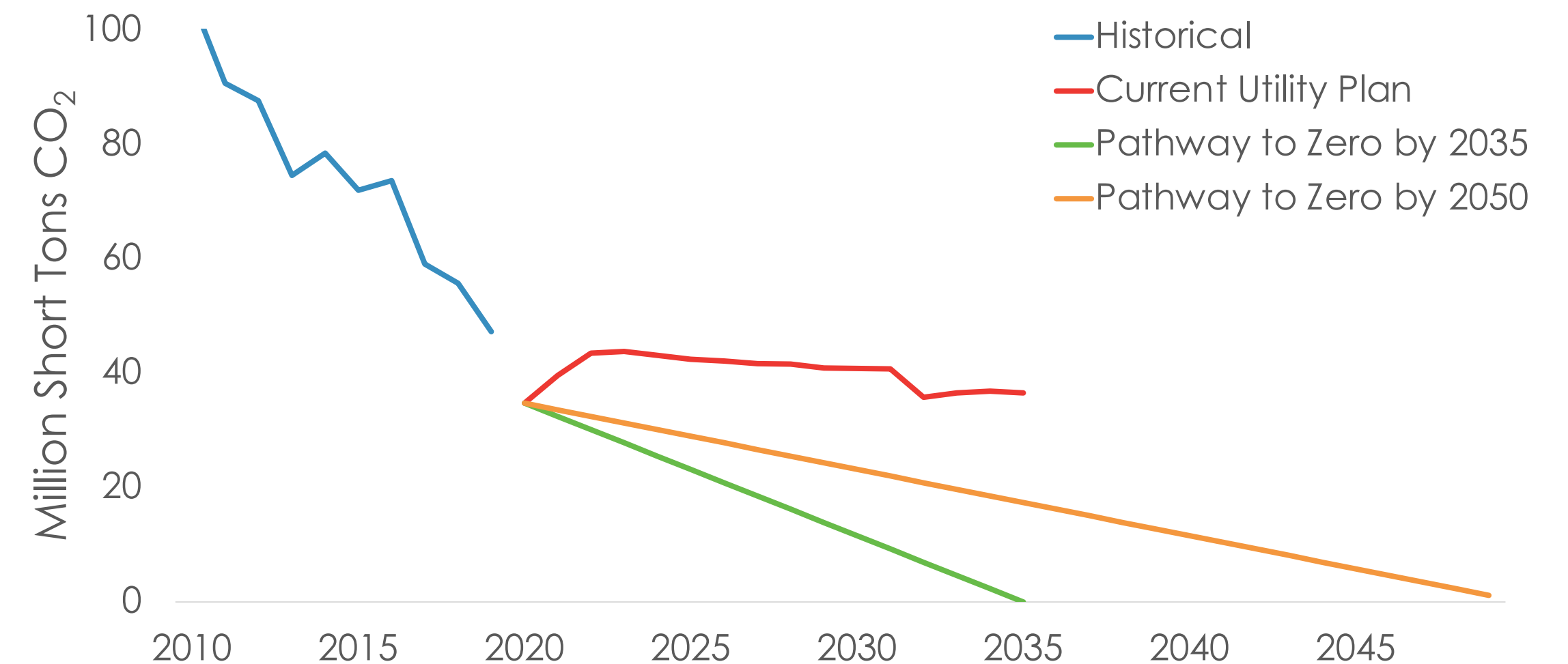
NO TIMELINE FOR ZERO

TVA has yet to set a target for becoming carbon-free. Instead, the utility has simply stated the expected reductions in its emissions *rate* over the next decade. TVA's resource plan, notably, is out of step with the Biden Administration's stated goal to decarbonize the power sector by 2035, despite the fact that TVA is a federal corporation and the largest public power utility in the country.

TVA saw the highest average annual percent of emission reductions from 2010-2019 in our region, primarily by replacing its heavy reliance on coal with fossil gas. That strategy cannot take anyone to zero emissions, however, because fossil gas has at least half the emissions of coal. To get back to its steep decarbonization rate TVA will need to start building up zero-emission resources like renewables, storage, and demand-side management to replace gas power plants.

TVA's current plan simply isn't enough. SACE has called on TVA and federal leadership to aim for TVA to lead the nation by getting to zero-carbon by 2030.

TVA PLANS VS. PATHWAYS TO ZERO



| Utility | Total CO ₂ (mTons) | | |
|--|-------------------------------|-----------|-----------|
| | 2010 | 2019 | 2030 |
| Total CO ₂ (mTons) | 105.4 | 47.3 | 40.9 |
| Lbs of CO ₂ / MWh) | 1,183 | 593 | 505 |
| | | 2010-2019 | 2020-2030 |
| % Decarb / Year | | -8.2% | -0.8% |
| Estimated year utility will approach zero based on decarbonization rate | | 2042 | Past 2100 |

TENNESSEE VALLEY AUTHORITY

TVA WELL-SUITED TO LEAD ON DECARBONIZATION

A TVA leadership role is a natural fit for a number of reasons.

1. TVA was founded in the 1930s as part of the New Deal as a 100% renewable energy-powered utility, and has led on national missions in the past. The mission is different, but TVA's role would be similar.
2. TVA's portfolio already includes zero-carbon resources, and hydroelectric and pumped-storage plants can help the utility integrate more wind and solar onto its system.
3. TVA's geographic location puts it at an intersection to connect the solar-rich Southeast with the wind-rich Midwest.
4. High electricity use means there is a large potential for energy efficiency and other demand-side measures to reduce energy use, reduce emissions, and keep customer costs low.
5. TVA is a federal corporation, and thus an extension of the current administration.

WHAT TVA IS SAYING...

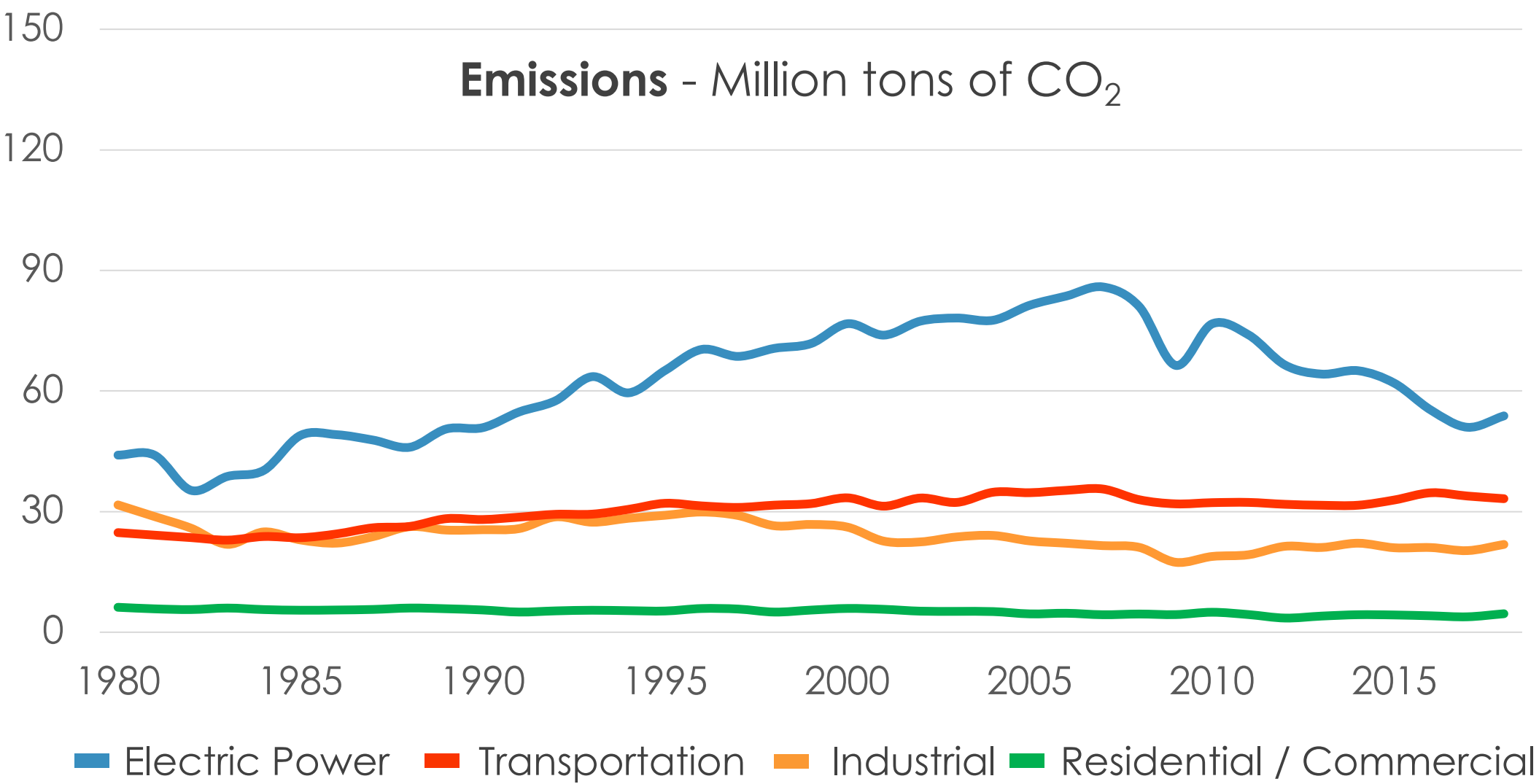
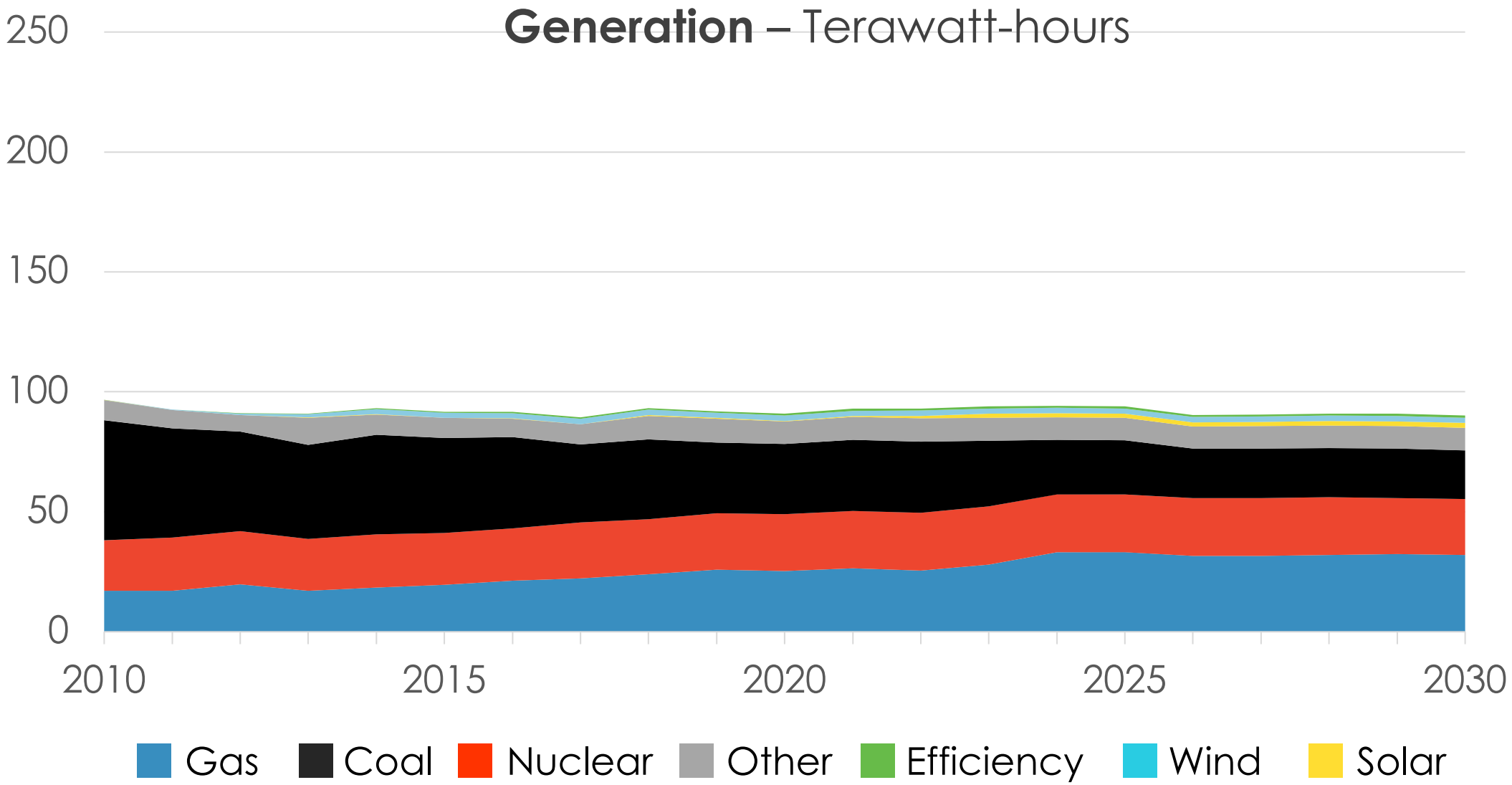
[WE HAVE] ALREADY LOWERED OUR GREENHOUSE GAS EMISSIONS BY 60% WHEN COMPARED TO THE 2005 BENCHMARK...WE'RE COMMITTED TO CONTINUING THIS EFFORT BY EXECUTING OUR PLAN TO REDUCE EMISSIONS 70% BY 2030 AND BUILDING A PATH... TO AN 80% REDUCTION.

~TVA CEO JEFF LYASH TESTIFYING IN FRONT OF THE US SENATE ENERGY AND NATURAL RESOURCES COMMITTEE ON MARCH 26, 2021

WHAT TVA IS DOING...

TVA plans to continue to run coal while building new fossil gas. TVA has retired more than half of its coal fleet since 2000, but still runs three of the oldest coal plants in the country: Shawnee in Kentucky, and Kingston and Gallatin in Tennessee. TVA's plans include only minor future coal retirements: the small Bull Run in 2023 and some units at Shawnee in 2032. Additionally TVA announced in early 2021 that it plans to build 1,500 MW of new fossil gas capacity to be online by 2023.

ALABAMA



STATE MOTTO “WHEN IN DOUBT, BURN COAL”

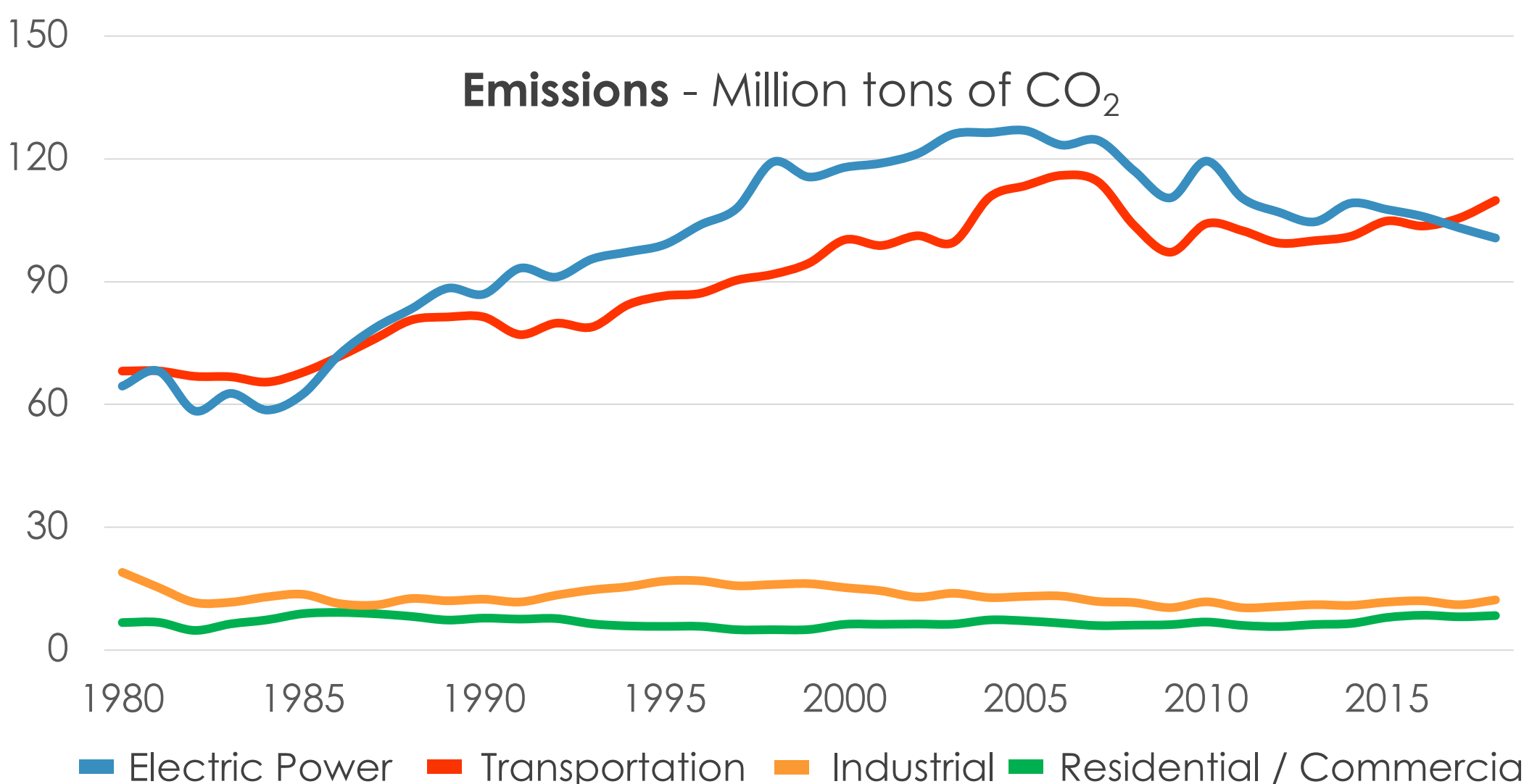
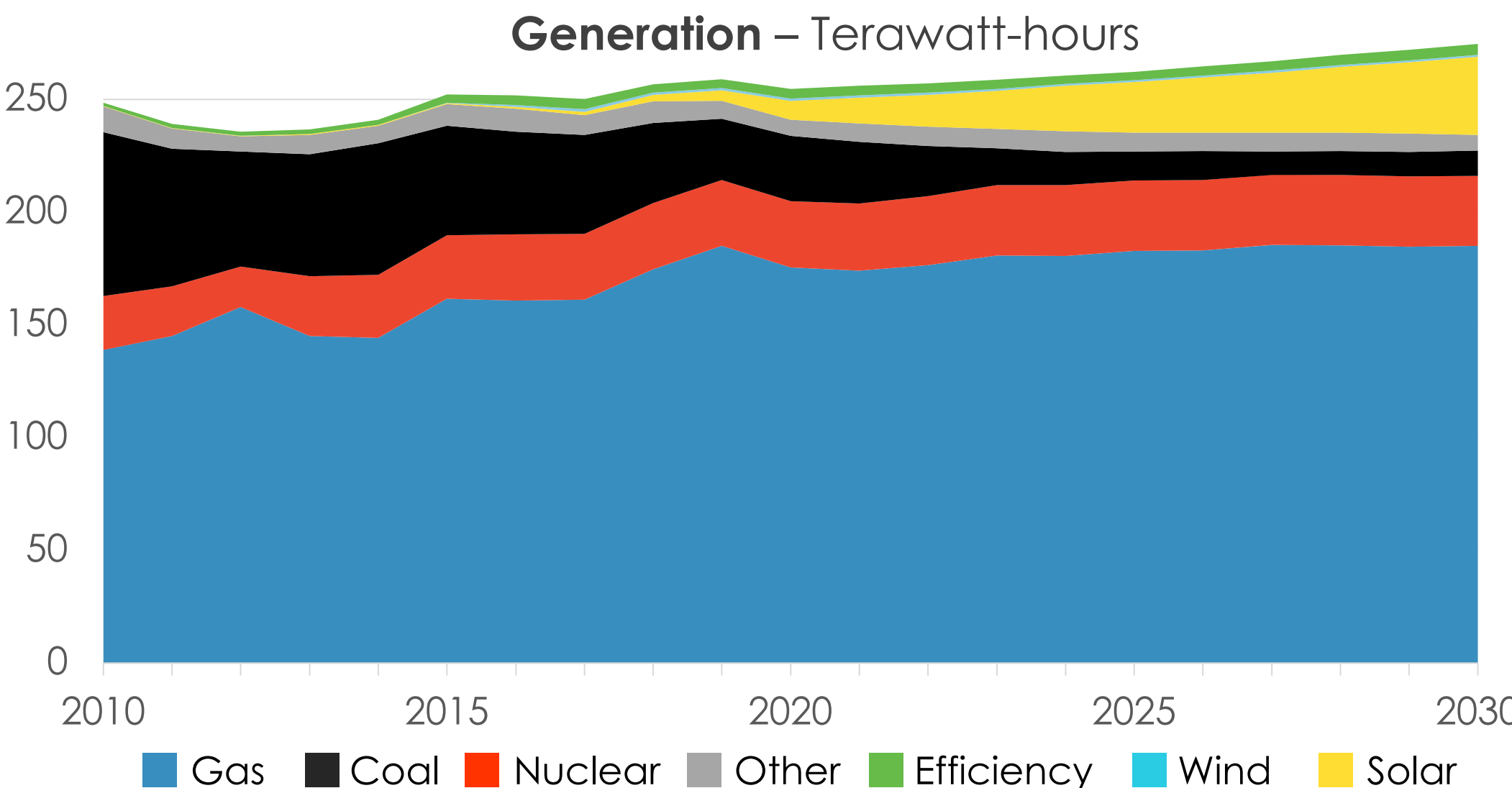
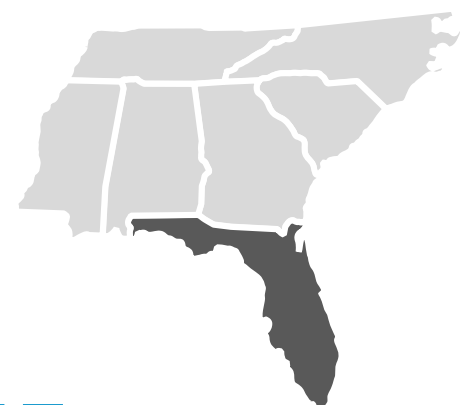
Alabama will only see slight decarbonization over the next 3-5 years due to relatively few coal retirements. Clean energy penetration is also expected to remain the lowest in the region through 2030. Notably, Alabama utility regulator Twinkle Cavanaugh was recently quoted as saying, “When in doubt, burn coal,” while falsely attributing widespread outages in Texas to the state’s large wind portfolio.

In addition to the state’s punitive charges for solar, Alabama is also passing up opportunities for wind development. NREL recently estimated that Alabama has 175,000 GWh of offshore wind technical potential. While not the highest in the Southeast, this could still add to the state’s renewable energy mix, which is currently not expected to grow significantly from the 3% it currently contributes to the power supply.

| Alabama | | 2010 | 2019 | 2030 |
|-----------------------|--------------|-------|-------|-------|
| State CO ₂ | Million Tons | 63.9 | 43.9 | 36.1 |
| | Lbs/ MWh | 1,321 | 961 | 809 |
| % of Power | Fossil Fuels | 69.6% | 60.2% | 58.0% |
| | Clean Energy | 0.1% | 3.3% | 5.8% |

Clean energy is non-hydro renewables and efficiency.





FLORIDIANS' HEALTH AT STAKE

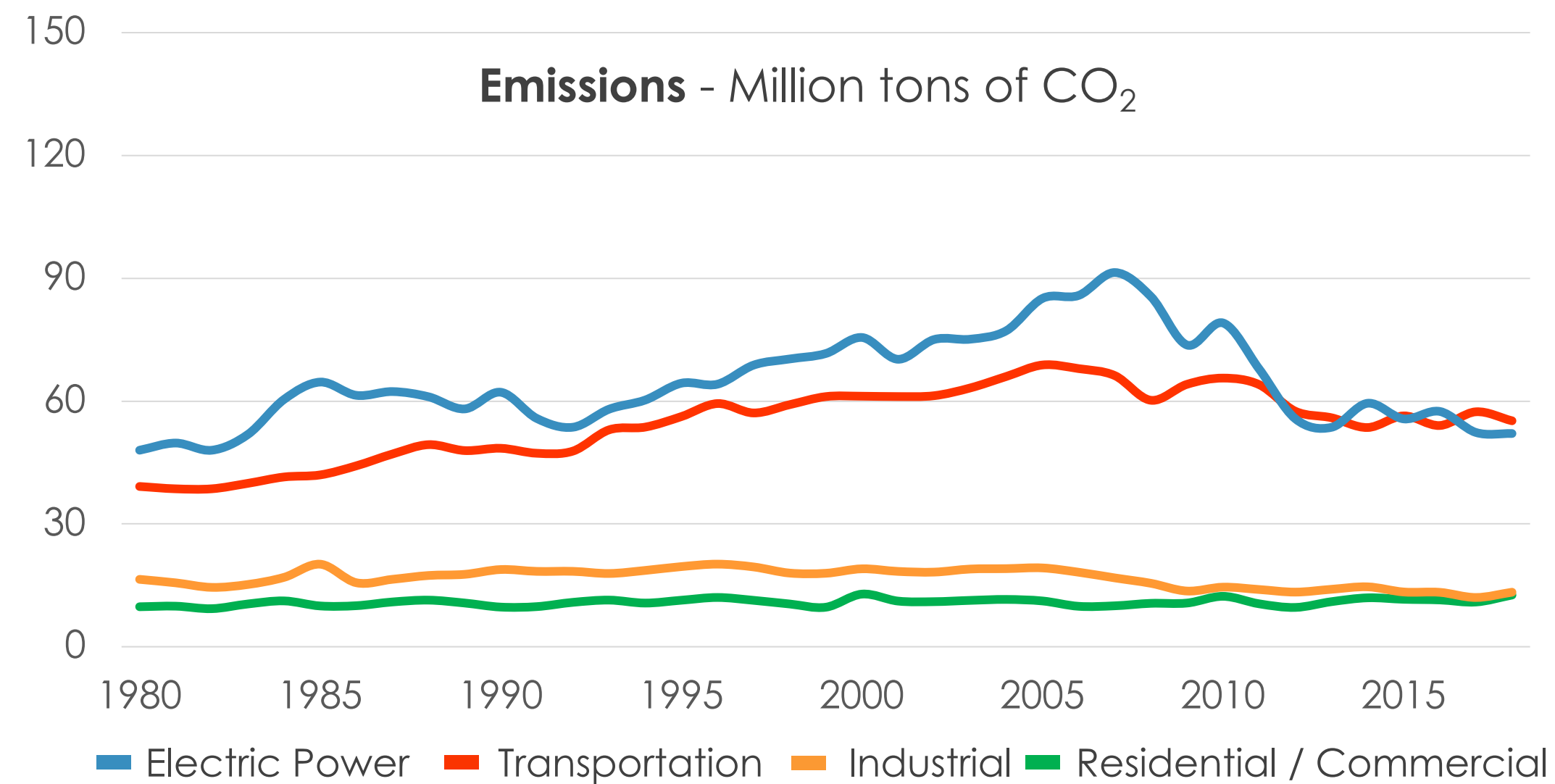
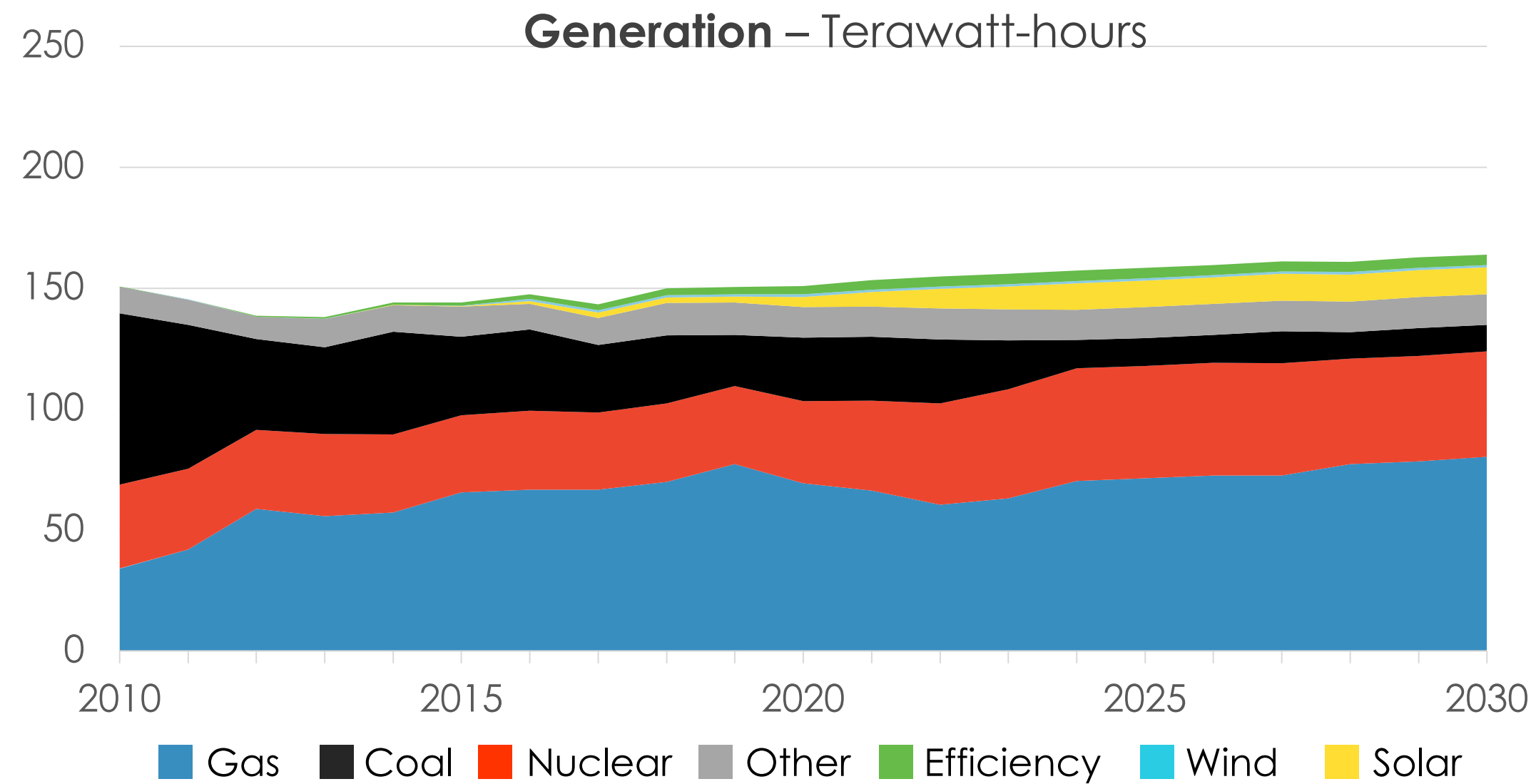
In addition to extreme weather, Florida is already seeing threats to the health of its residents from climate change. With sea-level rise, killer heat, and vector-borne disease on the rise, over 70 U.S. major medical groups, including Florida Clinicians for Climate Action, have declared that climate change is a “true public health emergency.”

GAS ADDITIONS BLUNT IMPACT OF SOLAR

As part of a rate case settlement, Duke Energy Florida recently agreed to accelerate the retirement of two coal units from 2042 to 2034. Although these units represent about one third of the utility's projected annual emissions, the impact to the state will be blunted by adding nearly 3,000 MW of additional gas capacity.

| Florida | | 2010 | 2019 | 2030 |
|-----------------------|--------------|-------|-------|-------|
| State CO ₂ | Million Tons | 156.2 | 121.0 | 95.8 |
| | Lbs/ MWh | 1,259 | 951 | 716 |
| % of Power | Fossil Fuels | 87.0% | 82.8% | 72.0% |
| | Clean Energy | 0.6% | 3.7% | 14.7% |

Clean energy is non-hydro renewables and efficiency.



GAS GROUPS CIRCUMVENT CITIES

In an effort to decarbonize, some states have set “all-electric construction requirements” that limit fossil fuel use in new buildings by prohibiting gas connections. Other states, including Georgia, are instead moving to stop these gas bans. Notably, the legislators sponsoring this Georgia bill do not represent cities that have made commitments to reduce CO₂ like Savannah and Athens.

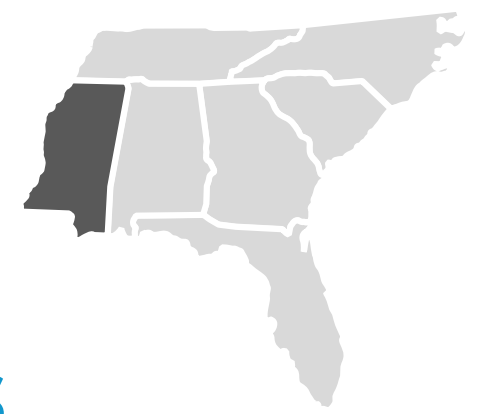
A TALE OF TWO PLANTS

Two major Georgia power plants, Vogtle and Scherer, have come under scrutiny for environmental, health, and financial impacts on customers. Plant Scherer, one of the largest polluters in the country, has numerous issues with coal ash storage and disposal. Vogtle, expected to provide power to Georgia Power, municipal utilities, and EMCs, has had numerous schedule and cost overruns. Current projections estimate Vogtle 3 will come online by early 2022.

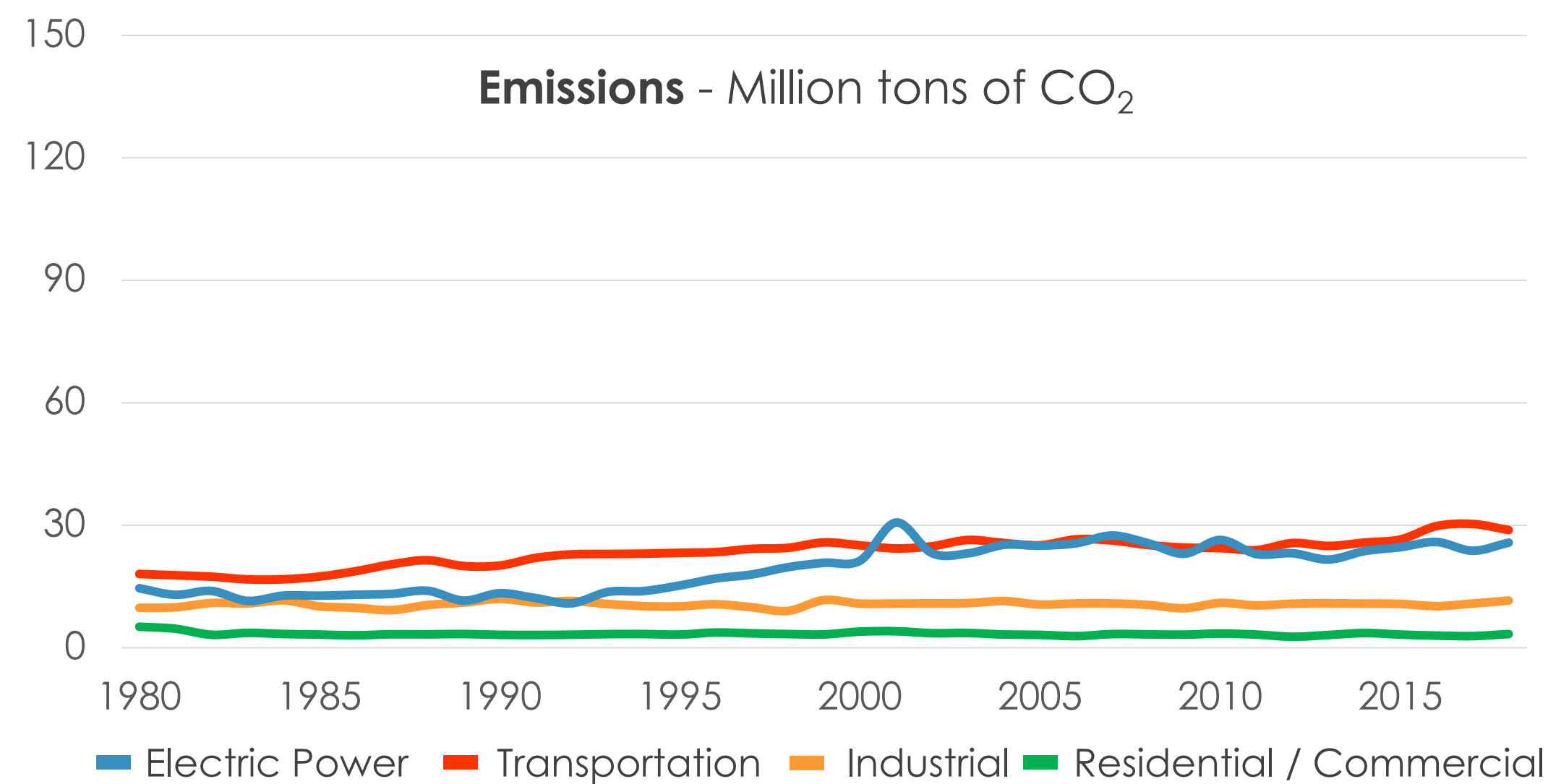
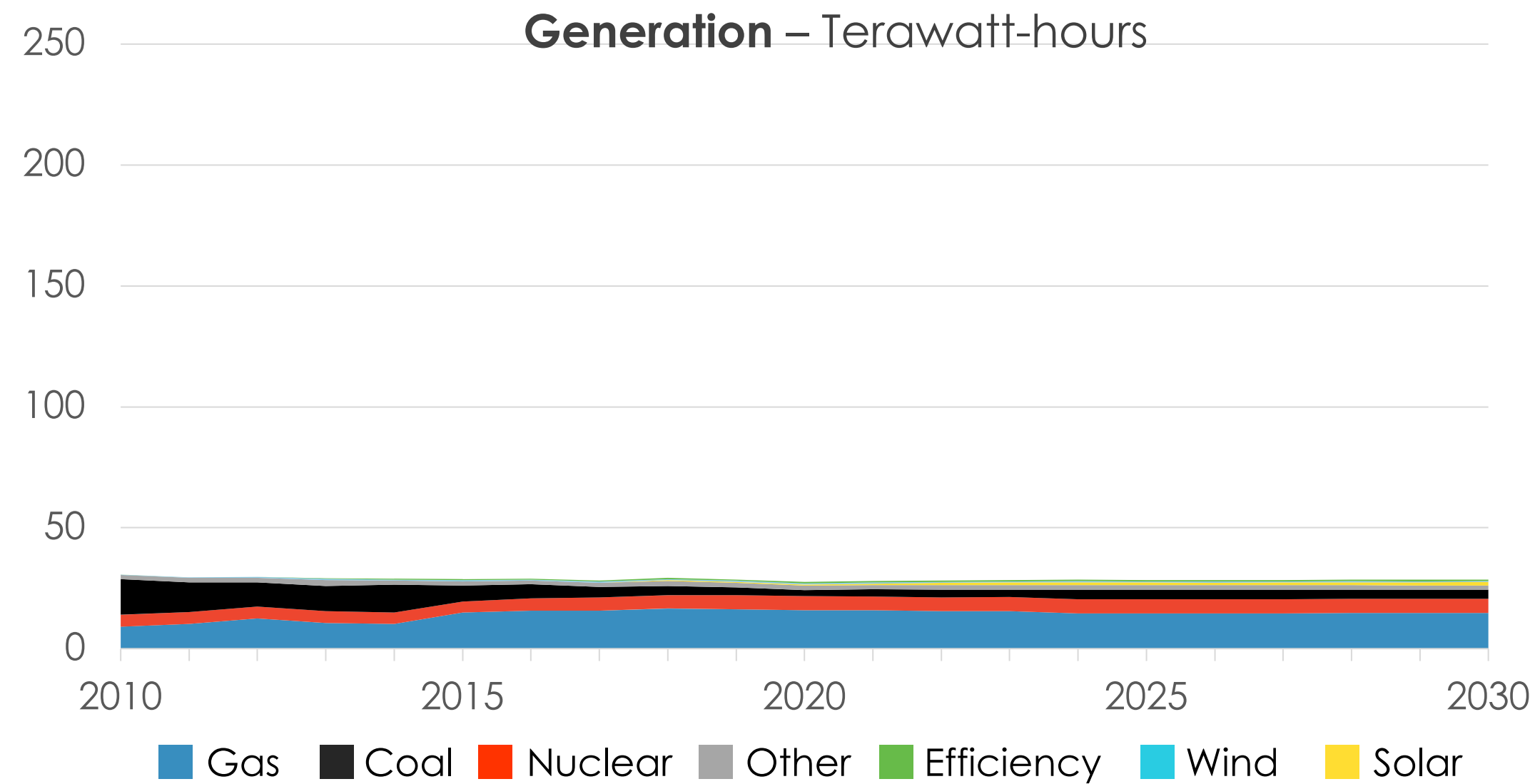
| Georgia | | 2010 | 2019 | 2030 |
|-----------------------|--------------|-------|-------|-------|
| State CO ₂ | Million Tons | 98.7 | 67.4 | 56.9 |
| | Lbs/ MWh | 1,311 | 917 | 716 |
| % of Power | Fossil Fuels | 70.2% | 64.5% | 55.7% |
| | Clean Energy | 0.0% | 4.3% | 10.0% |

Clean energy is non-hydro renewables and efficiency.

MISSISSIPPI



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MIXED REGULATORY STATUS

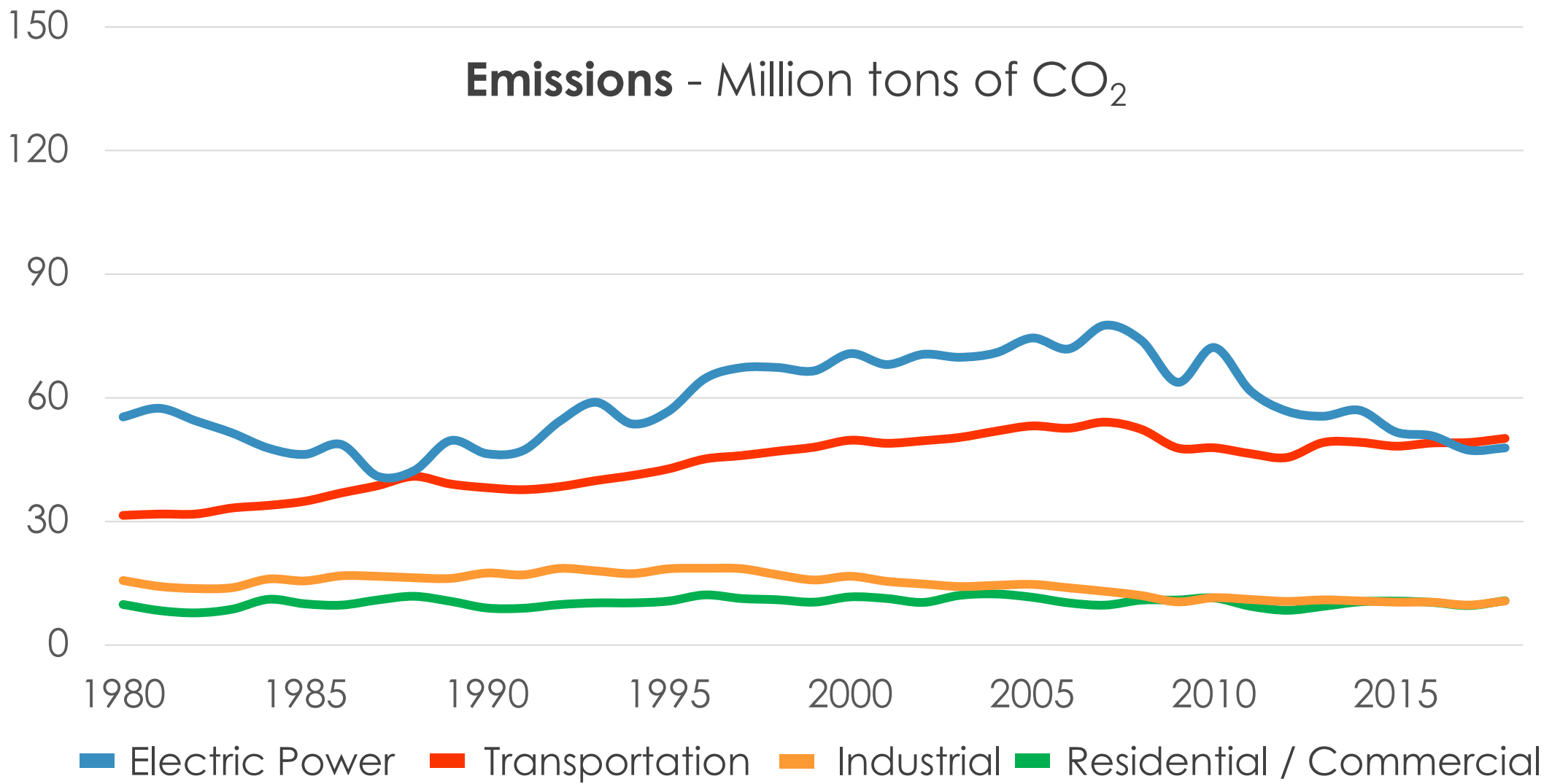
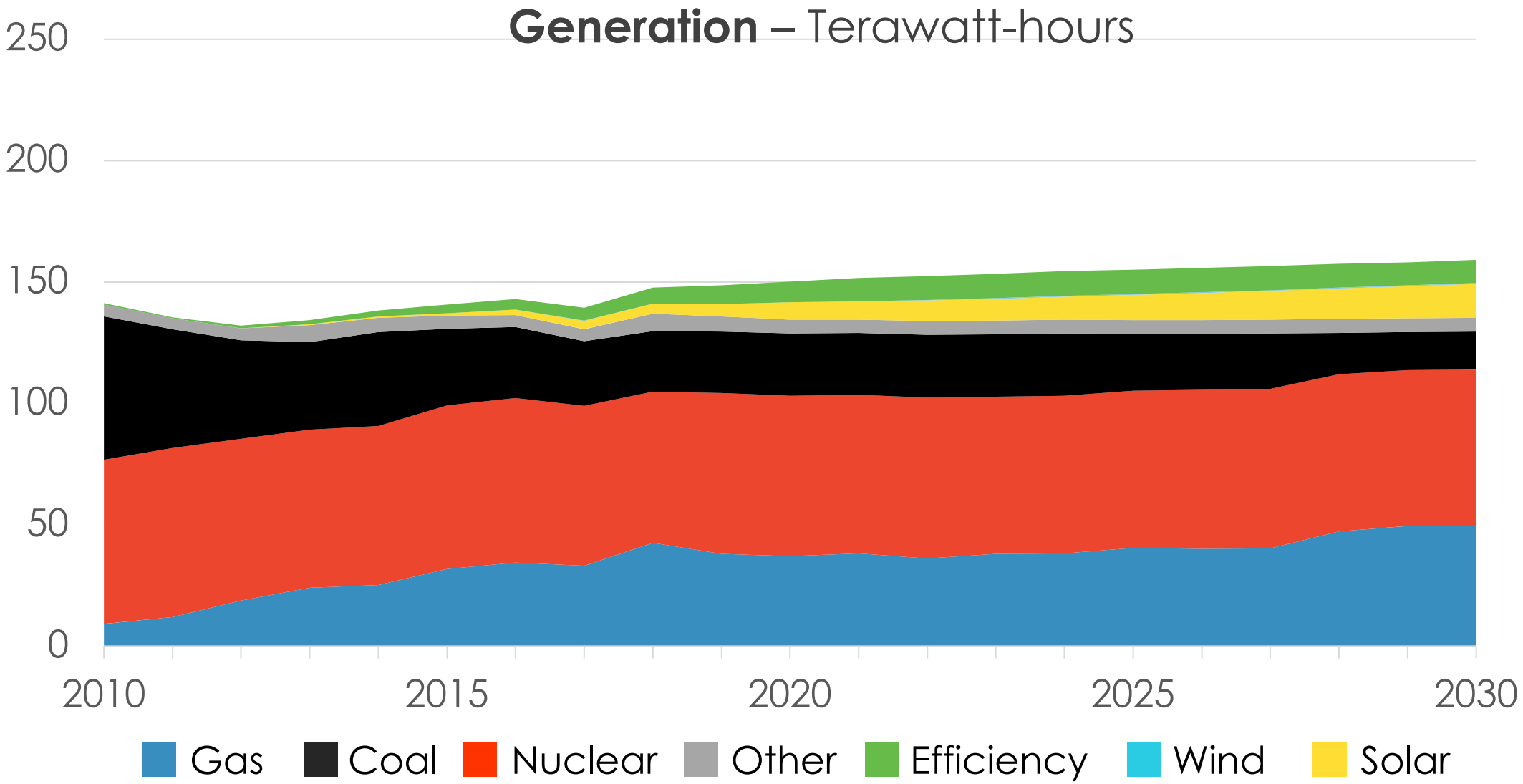
Mississippi is one of the only states in the country to have a relatively even mix of customers including a federal utility, vertically integrated utilities, and utilities that are members of interstate electricity markets like MISO. About 32% of energy sold in Mississippi is to customers of TVA, while over 44% is to utilities that participate in MISO, an interstate electricity market, and 23% to vertically integrated utility Mississippi Power Company.

TVA is not regulated by the Public Service Commission (PSC), but the first round of utility IRPs in Mississippi is currently underway. Until recently, the state did not require utilities to file an integrated resource plan to be approved by regulators.

| Mississippi | | 2010 | 2019 | 2030 |
|-----------------------|--------------|-------|-------|-------|
| State CO ₂ | Million Tons | 20.4 | 11.1 | 11.1 |
| | Lbs/ MWh | 1,337 | 790 | 796 |
| % of Power | Fossil Fuels | 77.8% | 68.3% | 65.0% |
| | Clean Energy | 0.3% | 4.7% | 8.1% |

Clean energy is non-hydro renewables and efficiency.

NORTH CAROLINA



STATEWIDE DECARBONIZATION UNDERWAY

North Carolina is the only state in the Southeast that has a statewide decarbonization goal in place. The Clean Energy Plan (CEP) will drive decarbonization in multiple sectors, including transportation. North Carolina has a goal to achieve 80,000 electric vehicle (EVs) on the road by 2025. In 2020, there were approximately 24,000 registered EVs, and meeting the goal requires doubling the annual sales of EVs every year for three years.

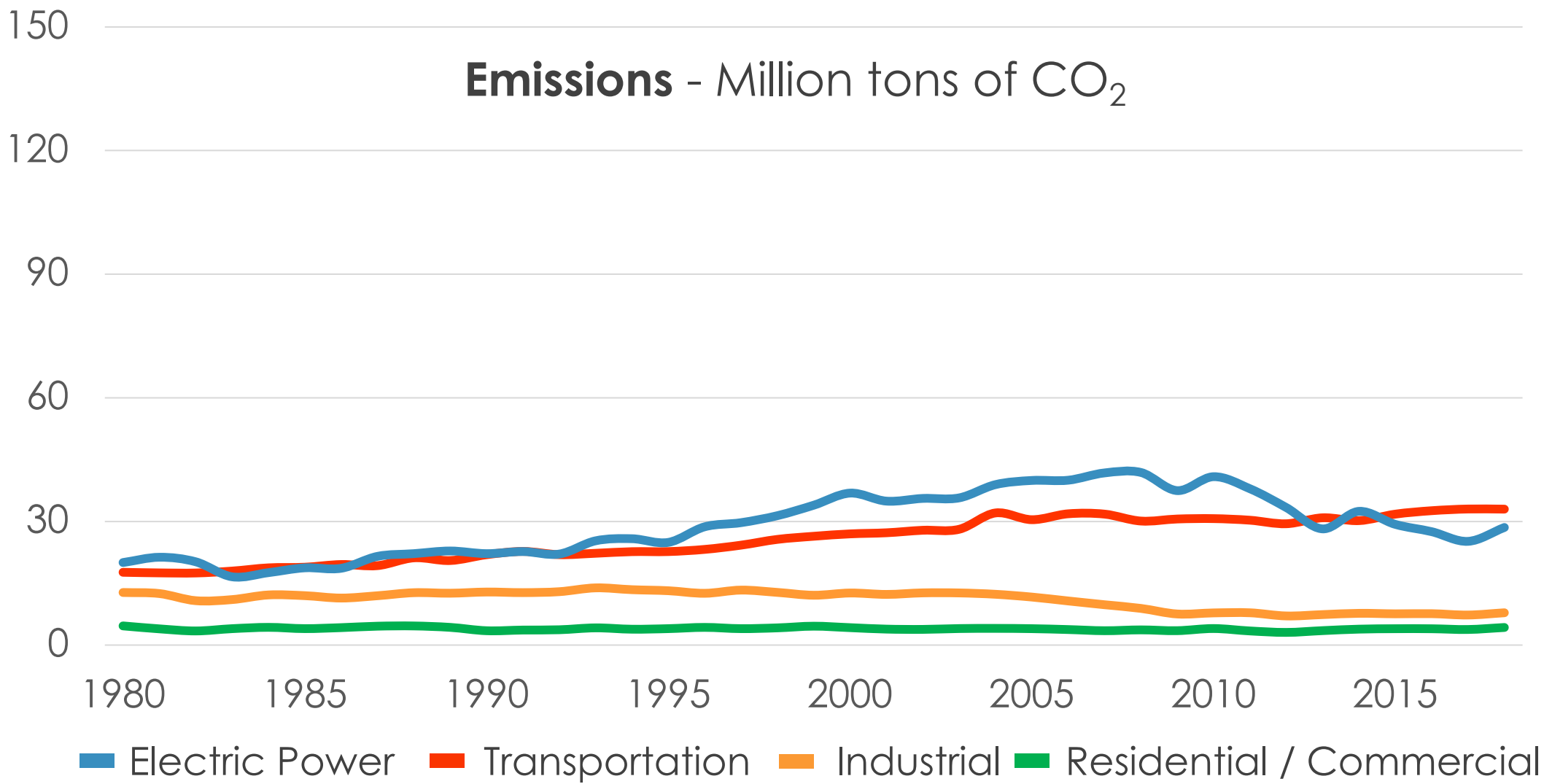
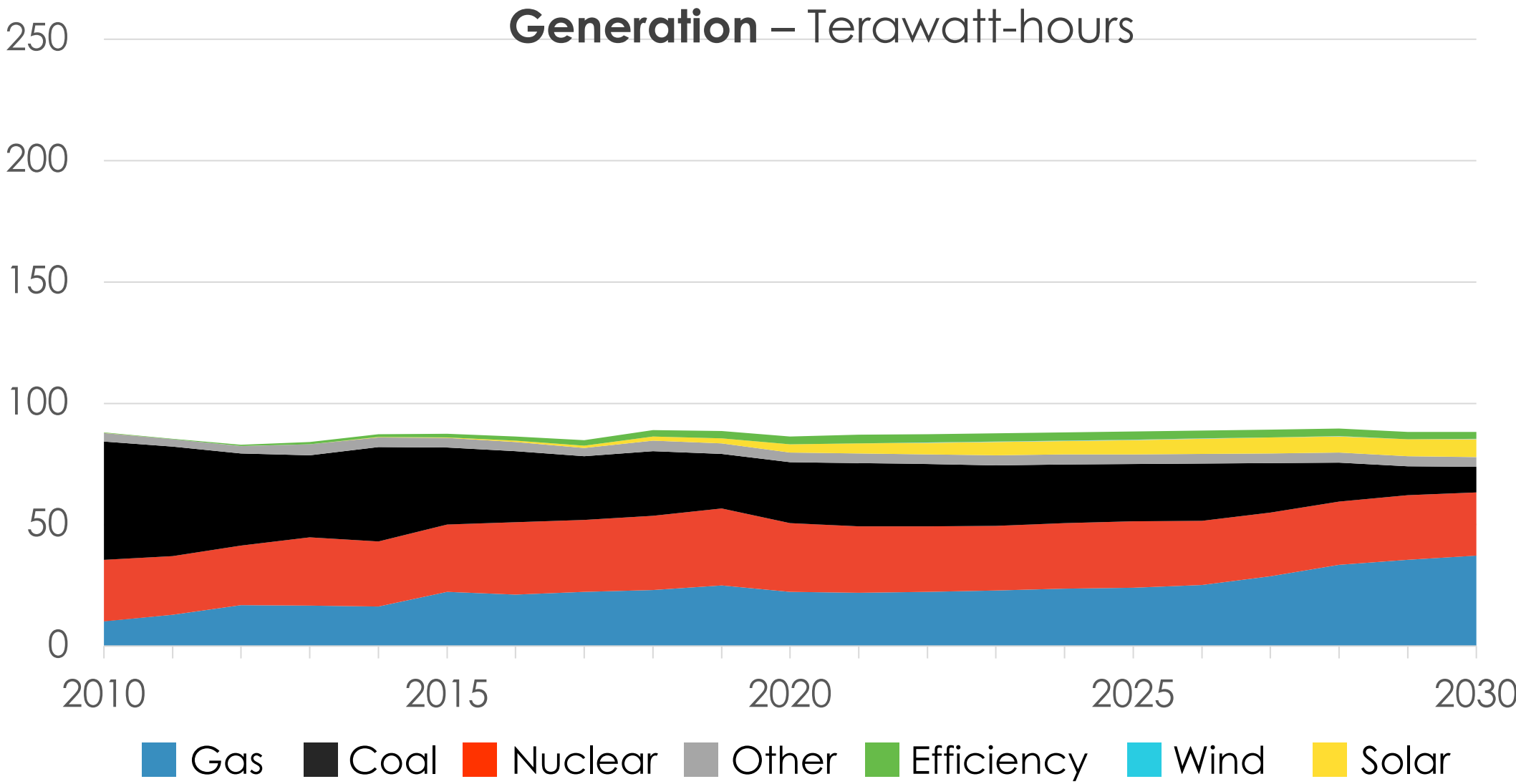
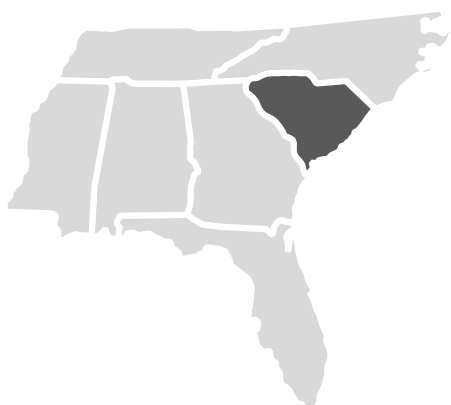
In the recent Recommendation A-1 Report, the state studied carbon-reduction policies to achieve the CEP emissions targets for the electric power sector, including different types of Clean Energy Standards (CES). Also in 2021, Governor Cooper proposed a budget that invests \$100 million in expanding access to clean energy technologies and building a clean energy workforce pipeline to catalyze the economy.

| North Carolina | | 2010 | 2019 | 2030 |
|-----------------------|--------------|-------|-------|-------|
| State CO ₂ | Million Tons | 67.9 | 45.9 | 37.8 |
| | Lbs/ MWh | 965 | 641 | 510 |
| % of Power | Fossil Fuels | 48.4% | 42.5% | 40.9% |
| | Clean Energy | 0.4% | 8.6% | 15.0% |

Clean energy is non-hydro renewables and efficiency.



SOUTH CAROLINA



DOMINION IRP REJECTED

Rejection of a long-term energy plan, or IRP, by any utility regulator has been historically rare – until now. In late 2020, the South Carolina PSC unanimously voted to reject Dominion Energy South Carolina’s (DESC) IRP since it did not comply with South Carolina’s Energy Freedom Act. This is the most significant decision handed down by the seven-member PSC so far.

BUYERS EYE SANTEE COOPER

South Carolina has yet to decide how to move forward with state-owned utility Santee Cooper, and whether to reform or sell it to a buyer without a true decarbonization plan. Possible issues under consideration include closer oversight of the utility’s resource planning and putting in place the framework for a just transition for workers and communities impacted by facility closures.

| South Carolina | | 2010 | 2019 | 2030 |
|-----------------------|--------------|-------|-------|-------|
| State CO ₂ | Million Tons | 57.4 | 36.7 | 28.9 |
| | Lbs/ MWh | 1,308 | 862 | 682 |
| % of Power | Fossil Fuels | 67.0% | 53.6% | 54.2% |
| | Clean Energy | 0.2% | 5.9% | 11.8% |

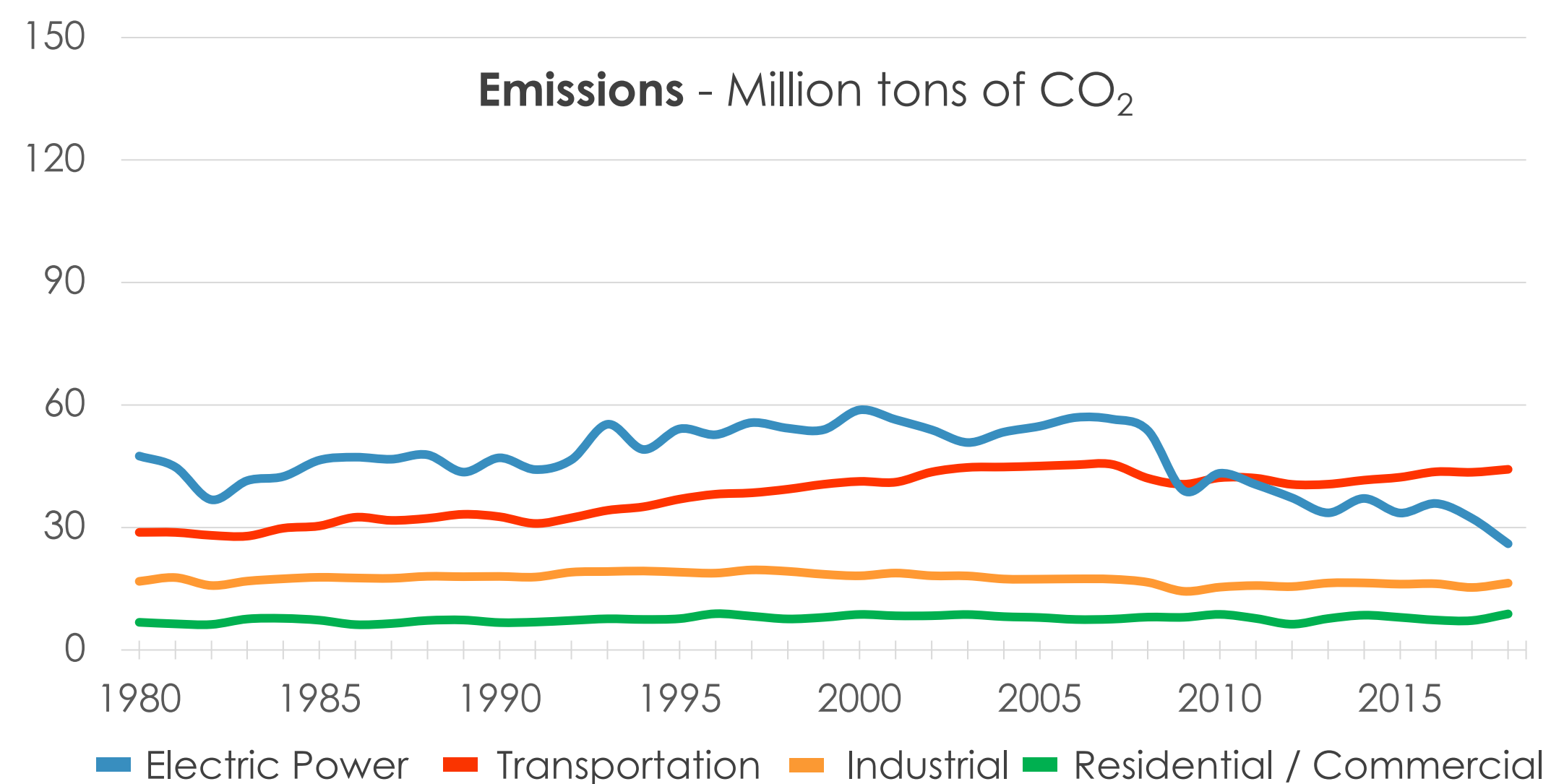
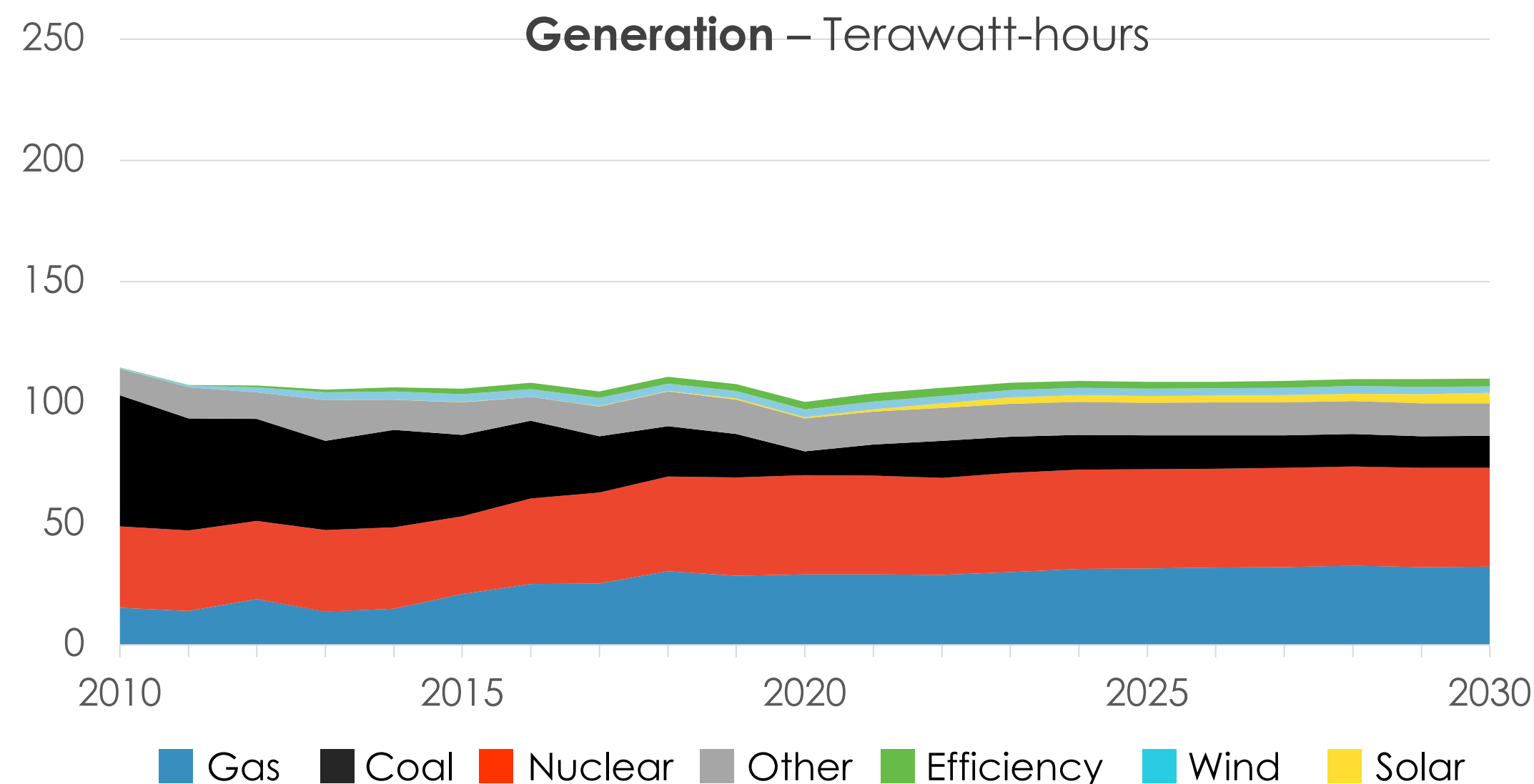
Clean energy is non-hydro renewables and efficiency.



TENNESSEE



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TRANSMISSIONS TENSIONS IN TENNESSEE

In early 2021 several of TVA's utility customers filed a complaint with the Federal Energy Regulatory Commission (FERC) against TVA for violating federal law by not allowing them to access TVA's transmissions system. This prevents them from buying energy from sources other than TVA, which may offer a power supply that is cleaner, cheaper, and less risky.

ENVIRONMENTAL JUSTICE ON DISPLAY

In a rare win for frontline communities in the Southeast, the Shelby County Commission recently voted against selling land in Southwest Memphis to construct the Byhalia Pipeline. In addition to exposing a predominantly black, low-income neighborhood to potential water pollution, the pipeline would prolong dependence on fossil fuel use for transportation.

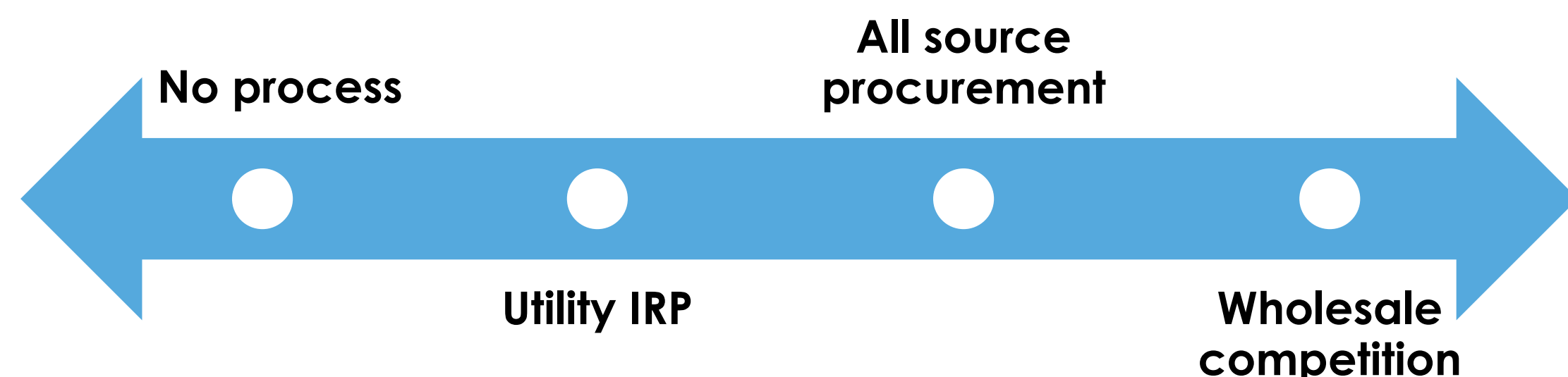
| Tennessee | | 2010 | 2019 | 2030 |
|-----------------------|--------------|-------|-------|-------|
| State CO ₂ | Million Tons | 67.6 | 31.0 | 26.8 |
| | Lbs/ MWh | 1,181 | 592 | 504 |
| % of Power | Fossil Fuels | 60.6% | 43.5% | 41.1% |
| | Clean Energy | 0.5% | 5.9% | 9.2% |

Clean energy is non-hydro renewables and efficiency.

RESOURCE PLANNING

COMPETITIVE MODELS & CLEAN ENERGY

Across the Southeast future resources are mostly decided through utility Integrated Resource Plans. Outside of the Southeast most electric customers reside in parts of the country that have competitive electric markets where price signals drive resource decisions not an IRP. Market structures vary widely, though areas with markets have tended to see a more rapid adoption of clean energy technologies since they are able to compete on a more even playing field with new and existing conventional resources like large centralized fossil fuel power plants. One option to increase competition without a full competitive market is to employ the all source procurement model in addition to a traditional IRP.



WHAT IS AN IRP?

Utilities regularly evaluate long-term resource plans to produce what is typically called an Integrated Resource Plan, or IRP. The amount and source of energy that power the Southeast is collectively guided by the IRPs of utilities in the region. IRPs evaluate many potential scenarios. The goal is develop a resource mix that best fits forecasted energy demand. IRPs tend to be sensitive to a utility's chosen method and assumptions.

Since many aspects of generation resources can be considered during an IRP, they are also a tool where utilities have an opportunity to pursue decarbonization by adding a mix of solar, wind, efficiency, and storage. So far, Southeast states have been slow to use the IRP process to evaluate pathways to zero emissions. Instead, many utilities in the Southeast are primarily planning to build new fossil gas capacity despite the cost-effectiveness of zero-emission options. These decisions make it difficult to decarbonize at the pace required by the science.

ELECTRIC TRANSPORTATION

CO₂ INTENSITY TO MPG EQUIVALENT

| State | 2019 | | 2030 | |
|-------------------|-----------------------------|--------------|-----------------------------|--------------|
| | Lbs of CO ₂ /MWh | MPGe for EVs | Lbs of CO ₂ /MWh | MPGe for EVs |
| Alabama | 960.7 | 80 | 809.3 | 121 |
| Florida | 951.4 | 80 | 715.7 | 137 |
| Georgia | 916.9 | 83 | 715.6 | 137 |
| Mississippi | 790.0 | 97 | 796.1 | 123 |
| North Carolina | 640.6 | 119 | 510.0 | 192 |
| South Carolina | 861.8 | 89 | 681.7 | 144 |
| Tennessee | 591.9 | 129 | 504.3 | 194 |
| SE Average | 833.1 | 92 | 662.1 | 148 |

Miles per gallon equivalent calculated with most efficient electric vehicles (EV) increasing from 3.9 to 5.0 miles / kWh from 2019-2030.

ELECTRIFY TRANSPORTATION NOW

One way to think about emissions intensity is like the reverse of the miles per gallon metric for cars. From an emissions standpoint, burning one gallon of gasoline emits 19.6 lbs of CO₂. So how far can an electric vehicle travel while emitting the equivalent of one gallon of gas?

Based on the latest utility plans, **electric vehicles in the Southeast can drive for 92 miles on kWh charge with an equivalent emissions impact of a gallon of gas.** On top of that, the emissions intensity of the power supply is expected to fall approximately 20% over the next decade. This means that electric vehicles (EVs) that charge using electricity will get cleaner over time, and in 2030 will increase the MPGe to 148 miles.

States such as Florida and North Carolina are expecting larger reductions over the next decade of 25% and 20% respectively. These reductions have the impact of increasing the miles per gallon equivalent by 60-70 miles.

JUST TRANSITION

ADVANCING EQUITABLE OUTCOMES

Transitioning the power supply from fossil fuels to clean energy comes with numerous benefits, including the opportunity to eliminate the systemic racial, economic, and class disparities of the climate crisis. In the Southeast, many states, communities, and individuals are already being affected by the climate crisis. A just transition should *also* seek equitable outcomes and distribution of benefits to those impacted by the transition as well, and seek to avoid reproducing existing disparities.



ALREADY STARTING OFF ON THE WRONG FOOT?

Many of the investor-owned utilities discussed in this report have set decarbonization goals outside of policies or mandates, and thus have nominally started the transition to clean energy... on their own terms. Companies, such as Duke and Southern, have also tied meeting goals to increased CEO compensation. However, this is in conflict with the fact that high costs are often falsely cited as barriers to decarbonization, and all costs associated with the transition are passed onto customers, rather than treated as a normal operating expense for the company.

WHY THE SOUTHEAST MATTERS FOR THE NATION



WE HAVE A NARROW MOMENT TO PURSUE ACTION AT HOME AND ABROAD IN ORDER TO AVOID THE MOST CATASTROPHIC IMPACTS OF THAT CRISIS AND TO SEIZE THE OPPORTUNITY THAT TACKLING CLIMATE CHANGE PRESENTS.

~PRESIDENT BIDEN EXECUTIVE ORDER ON TACKLING THE CLIMATE CRISIS AT HOME AND ABROAD IN JANUARY 2021

THE SOUTHEAST IS POISED FOR A LEAPFROG DECARBONIZATION STRATEGY

The Southeast does not have either the competitive markets or the state-wide renewable or efficiency standards that have driven clean energy resources in other parts of the country, so a federal Clean Energy Standard could have an outsized impact on the electricity fuel mix in the region. The relatively low adoption rates of electric vehicles (EVs) in the region, despite high vehicle manufacturing capacity, mean that the Southeast is poised to take advantage of falling costs for EVs, improved ranges, and more models to choose from. Thus the Southeast can leapfrog the beginning stages of electrification and decarbonization.

FIRST & WORST FOR IMPACTS OF CLIMATE CHANGE

The Southeast is home to many frontline communities. With proper direction, the clean energy transformation can be an opportunity to lift up those communities and right historical injustices. The coastal impacts of climate change, particularly stronger and more frequent hurricanes, are likely to continue to harm communities and infrastructure in the Southeast. Emission reductions from electricity generation and transportation are key tools to combat these impacts.

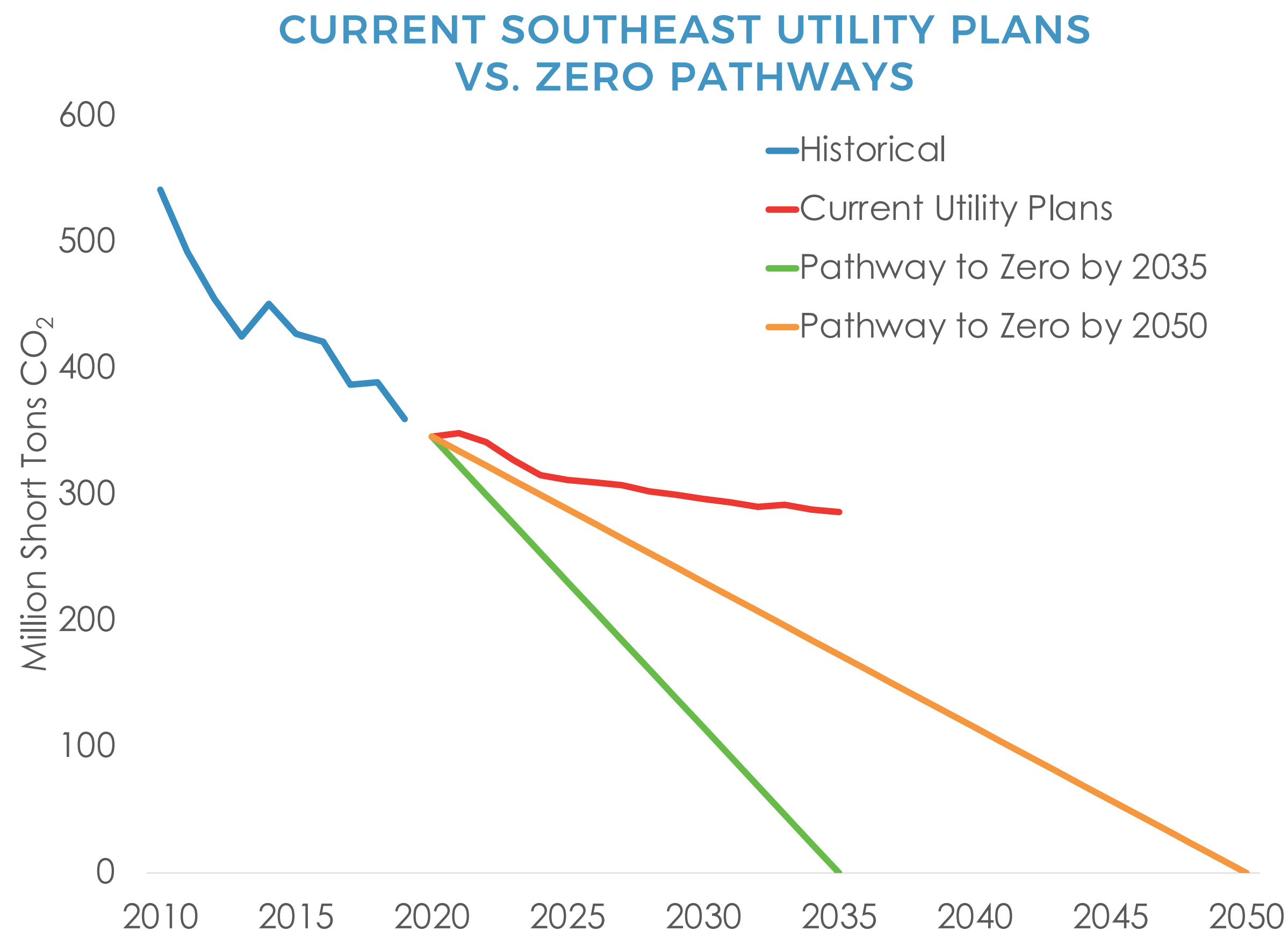
UNIQUE CIRCUMSTANCES PRESENT OPPORTUNITIES

The Southeast is home to the country's largest public power utility, TVA, which could be directed by the federal government to become a model carbon-free utility. The Southeast remains reliant on aging nuclear power plants. How those large, inflexible plants are operated on a low-carbon grid will be a particular challenge for utilities.

EMISSION TRENDS AND THE CLIMATE CRISIS

**GLOBAL GREENHOUSE GAS
EMISSIONS MUST
REACH NET-ZERO
BETWEEN 2040 & 2055
TO LIMIT GLOBAL TEMPERATURE RISE TO 1.5°C**

~IPCC SPECIAL REPORT, OCTOBER 2018



Scientific guidance is 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.

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

DATA SOURCES, METHODS, & ASSUMPTIONS

DATA SOURCES & ASSUMPTIONS

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).

U.S. Environmental Protection Agency (EPA) – *CO₂ Emission Performance Rate and Goal Computation Technical Support Document for CPP Final Rule*, Docket ID No. EPA-HQ-OAR-2013-0602 (August 2015).

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 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 is 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.

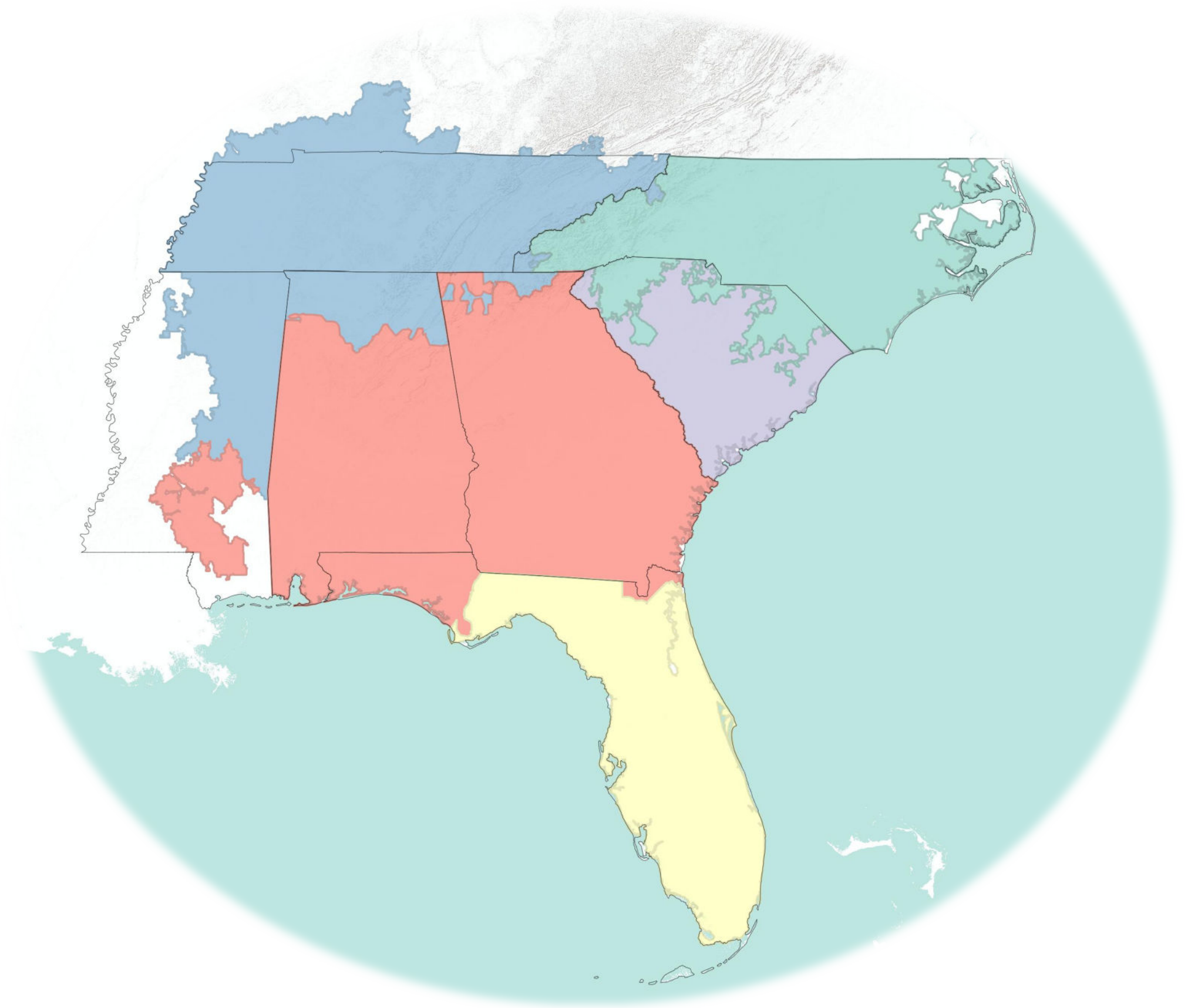
Additional details on sources, methods and assumptions for solar and energy efficiency resources are available in

- Southern Alliance for Clean Energy (2020). [Solar in the Southeast, Annual Report](#)
- Southern Alliance for Clean Energy (2021). [Energy Efficiency in the Southeast, Third Annual Report](#)

APPENDIX A & B

APPENDIX A: GEOGRAPHIC COVERAGE

The geographic coverage of data encompasses Southeastern utilities outside of interstate electricity markets such as PJM and MISO. The states of Alabama, Florida, Georgia, and South Carolina are fully covered. Relatively small portions of 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, Kentucky, and Virginia that are parts of the Tennessee Valley Authority or the Southern Planning Area are included.



APPENDIX B: EMISSIONS AND GENERATION DATA

Emissions and generation data used in the report are available for download. Because this report is inclusive of how power is sold between utilities and states, it uniquely presents emissions in terms of where the power is ultimately consumed, and not where it is generated.

For state and utility data for years 2010, 2019, and 2030 please [visit our website to access the appendix](#).

TRACKING DECARBONIZATION IN THE SOUTHEAST

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