TRACKING DECARBONIZATION IN THE SOUTHEAST

GENERATION + CO_2 EMISSIONS REPORT

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Southern Alliance for Clean Energy

ABOUT SACE

The Southern Alliance for Clean Energy (SACE) is a nonprofit organization that promotes responsible 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.

INTRODUCTION

REPORT SCOPE

Review regional CO_2 emission and generation trends in the **electric power sector in the Southeast**. Identify what current supply and demand forecasts tell us about the region's resource mix and future carbon emissions.

SACE analysis covers historical period of 2010-2018, and a forecast based on electric utility resource plans, or integrated resource plans (IRPs). Topics not included: analysis of sectors other than electric power, financial / cost figures for generation, detailed plans or pathways for decarbonization, and impacts of climate change.

GEOGRAPHIC COVERAGE

STATES / UTILITIES INCLUDED IN REPORT

This report covers Southeastern states and utilities that do not participate in interstate electricity markets (such as PJM/MISO). State coverage is as follows:

COVERS ENTIRE STATE

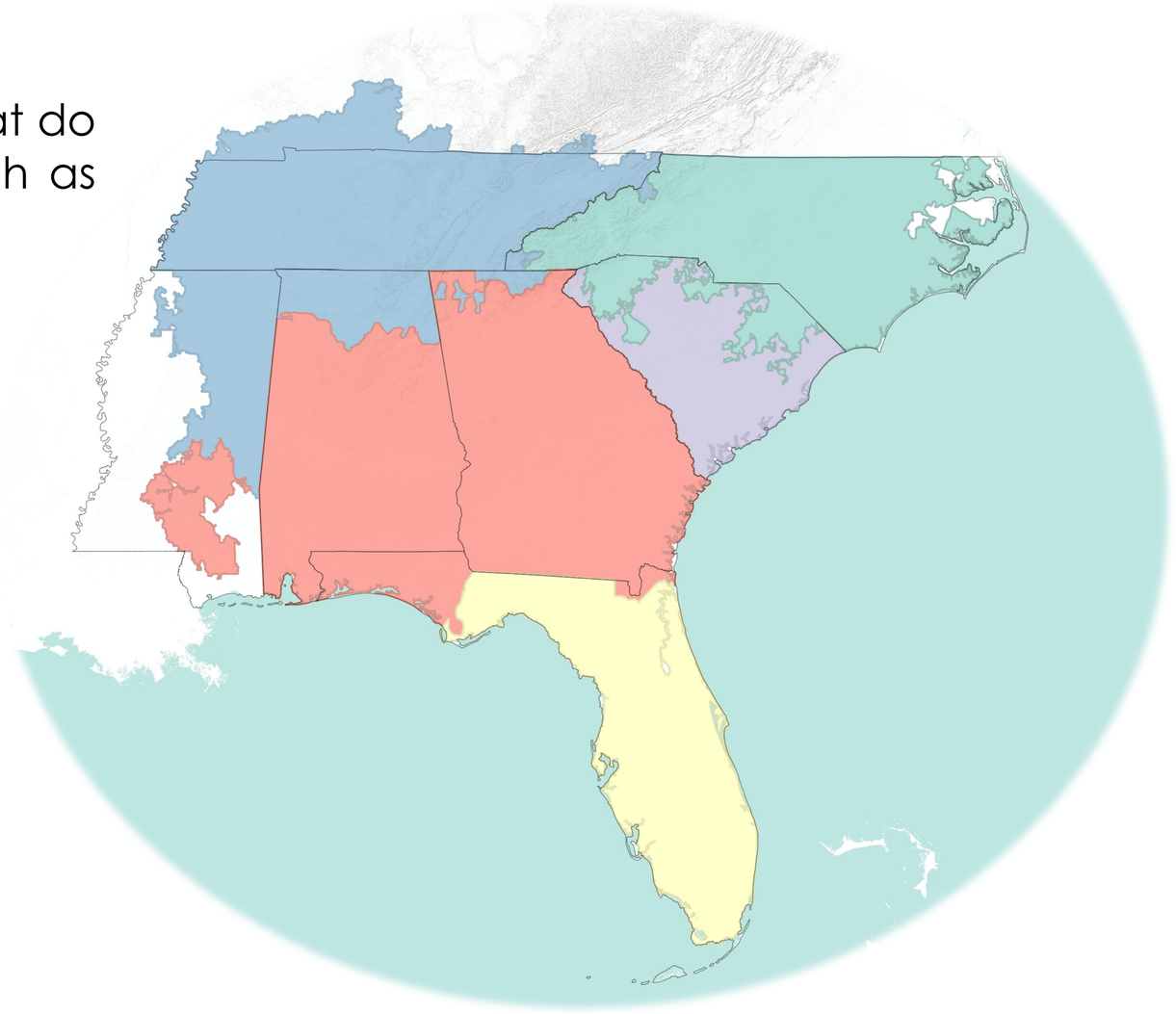
- Alabama
- Florida
- Georgia
- South Carolina

COVERS MAJORITY OF STATE

- North Carolina
- Tennessee

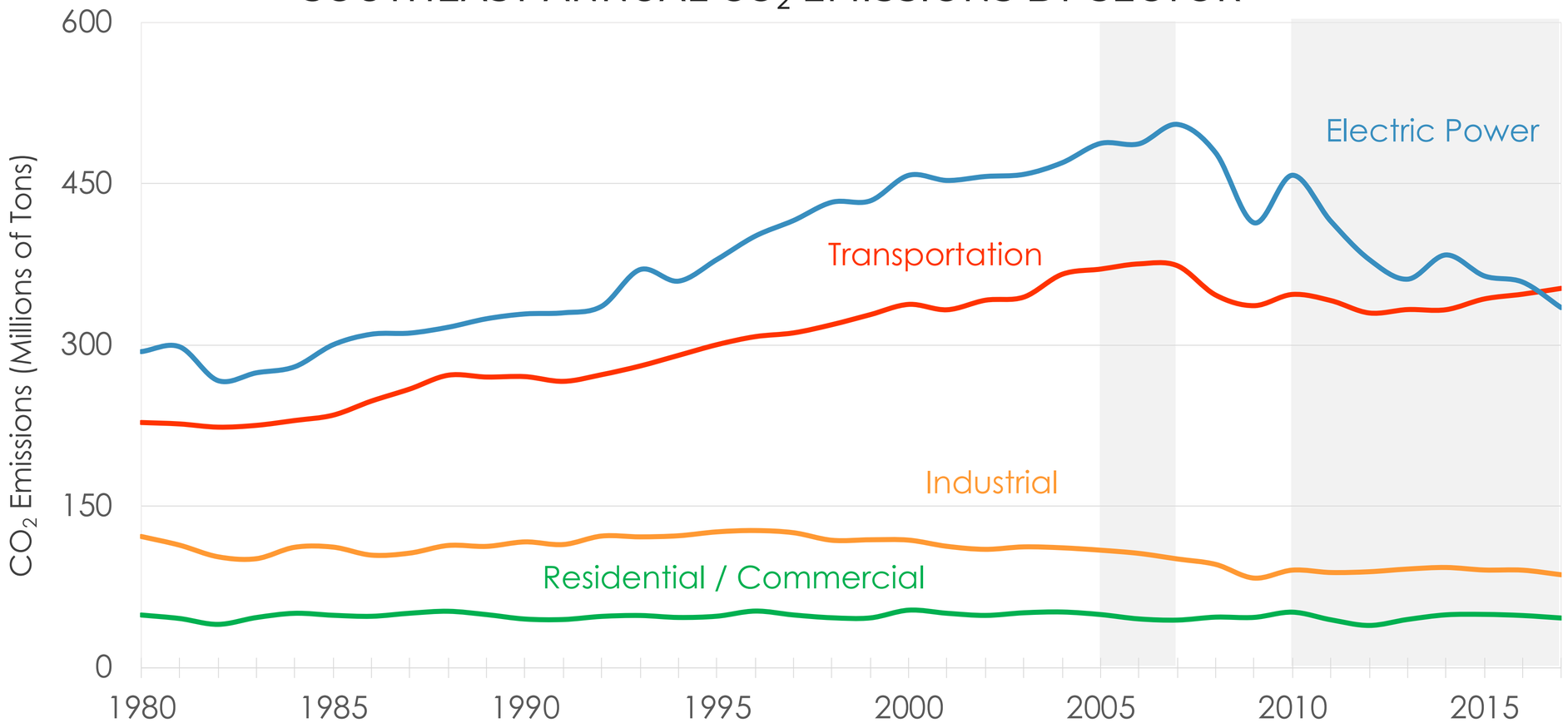
COVERS PART OF STATE

- Mississippi
- Kentucky



POWER SECTOR EMISSIONS IN CONTEXT

SOUTHEAST ANNUAL CO_2 EMISSIONS BY SECTOR

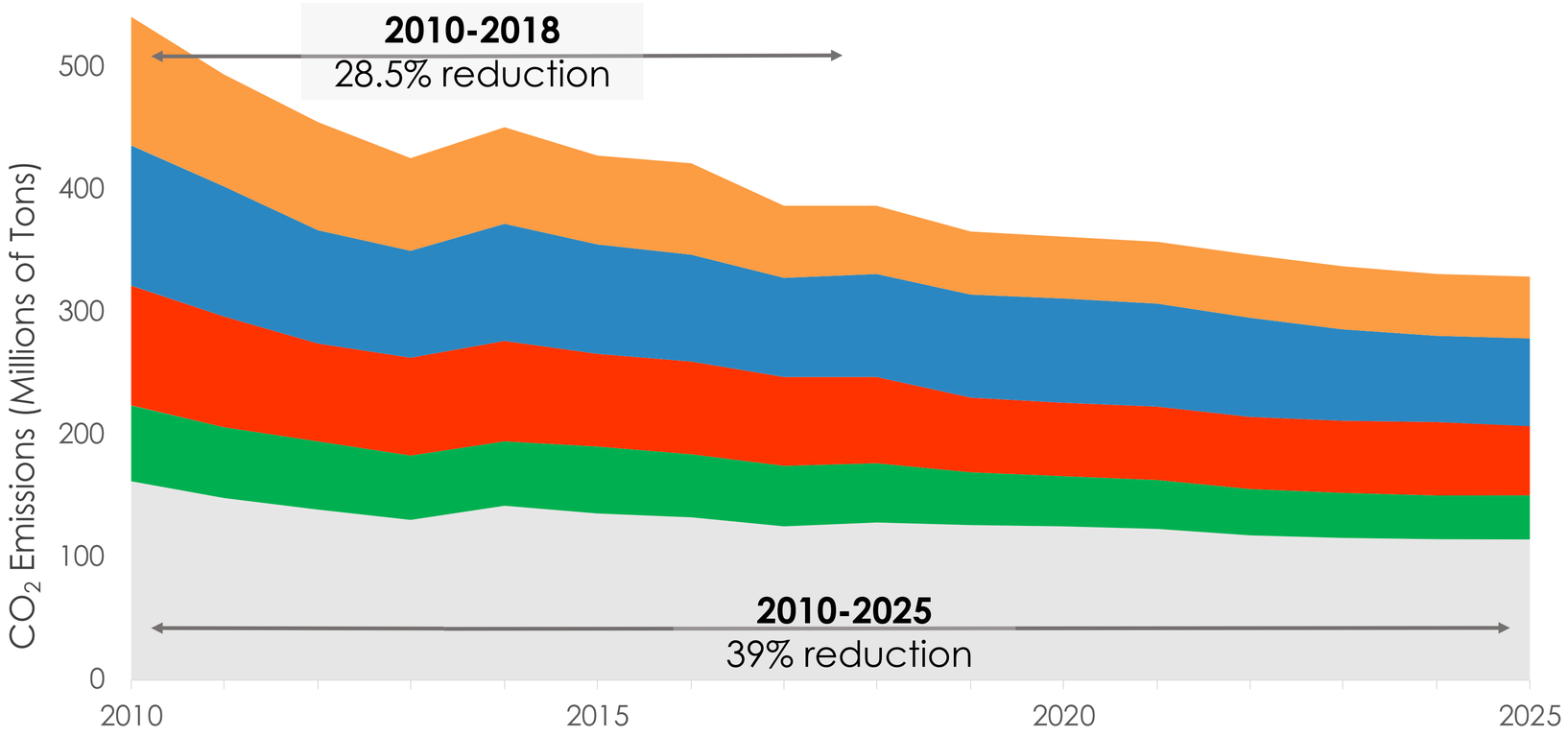


Source: U.S. Energy Information Administration (EIA) – State Carbon Dioxide Emissions for AL, FL, GA, MS, NC, SC, TN (1980-2017).

KEY TAKEAWAYS: Transportation is now the largest contributor to CO_2, *closely* followed by electric power. Power sector CO_2 peaked in 2007, and many decarbonization goals use 2005-2007 as baseline. Focus of the report is from 2010 to latest year data available.

EMISSIONS FORECAST FOR UTILITIES

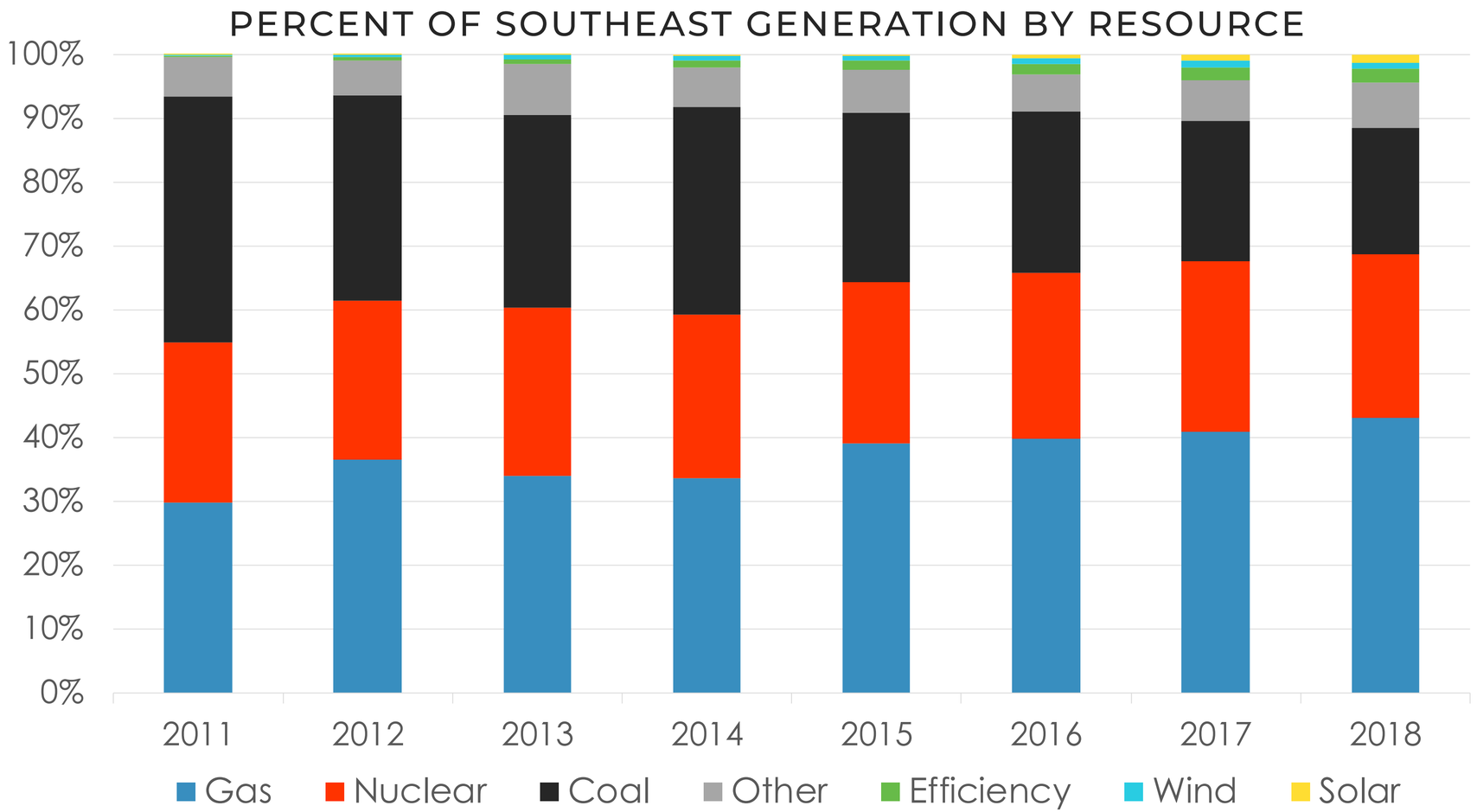
CO_2 EMISSIONS BY UTILITY GROUP



CO_2 millions of tons	2018	2025
Southeast Utilities Total	*387*	*329*
Tennessee Valley Authority	55	51
Southern Company	84	72
Duke Energy	71	56
NextEra	48	36
All Other Utilities	128	115

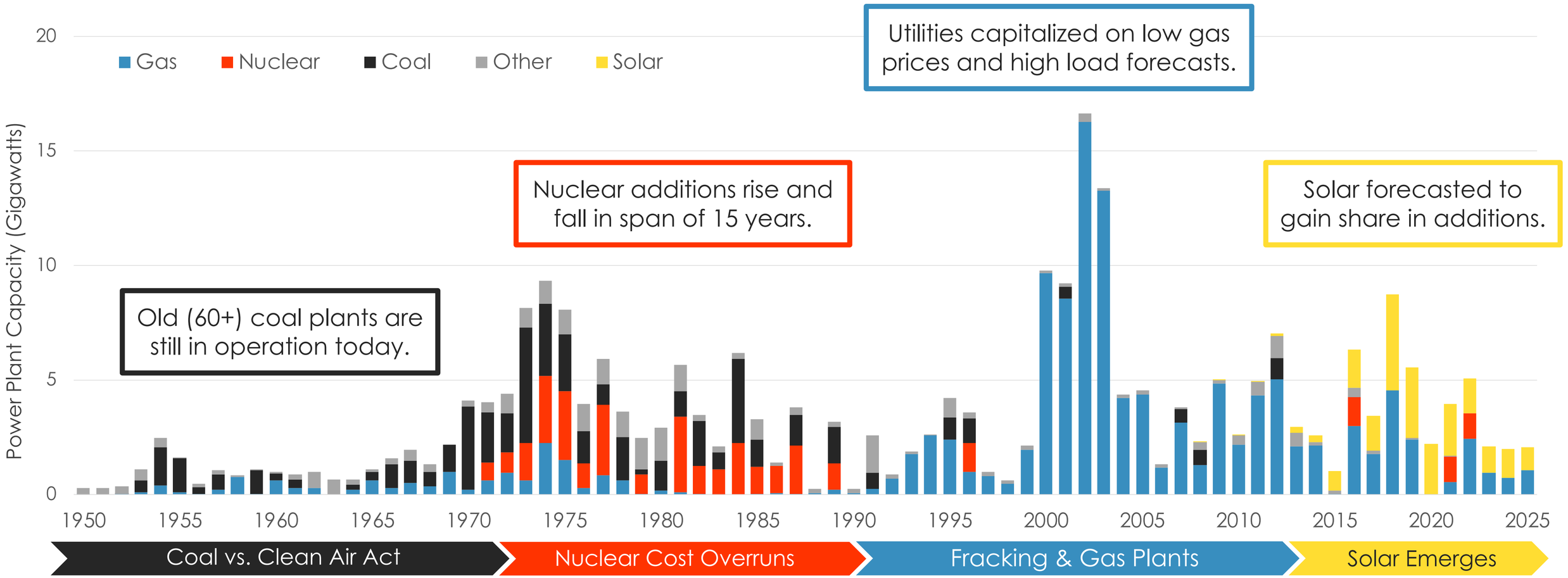
KEY TAKEAWAYS: Four major utility systems make up over 70% of total utility emissions for the Southeast. Carbon emissions have declined significantly over the past decade. Emission reductions are expected to slow in the future.

GENERATION: HISTORICAL RESOURCE MIX



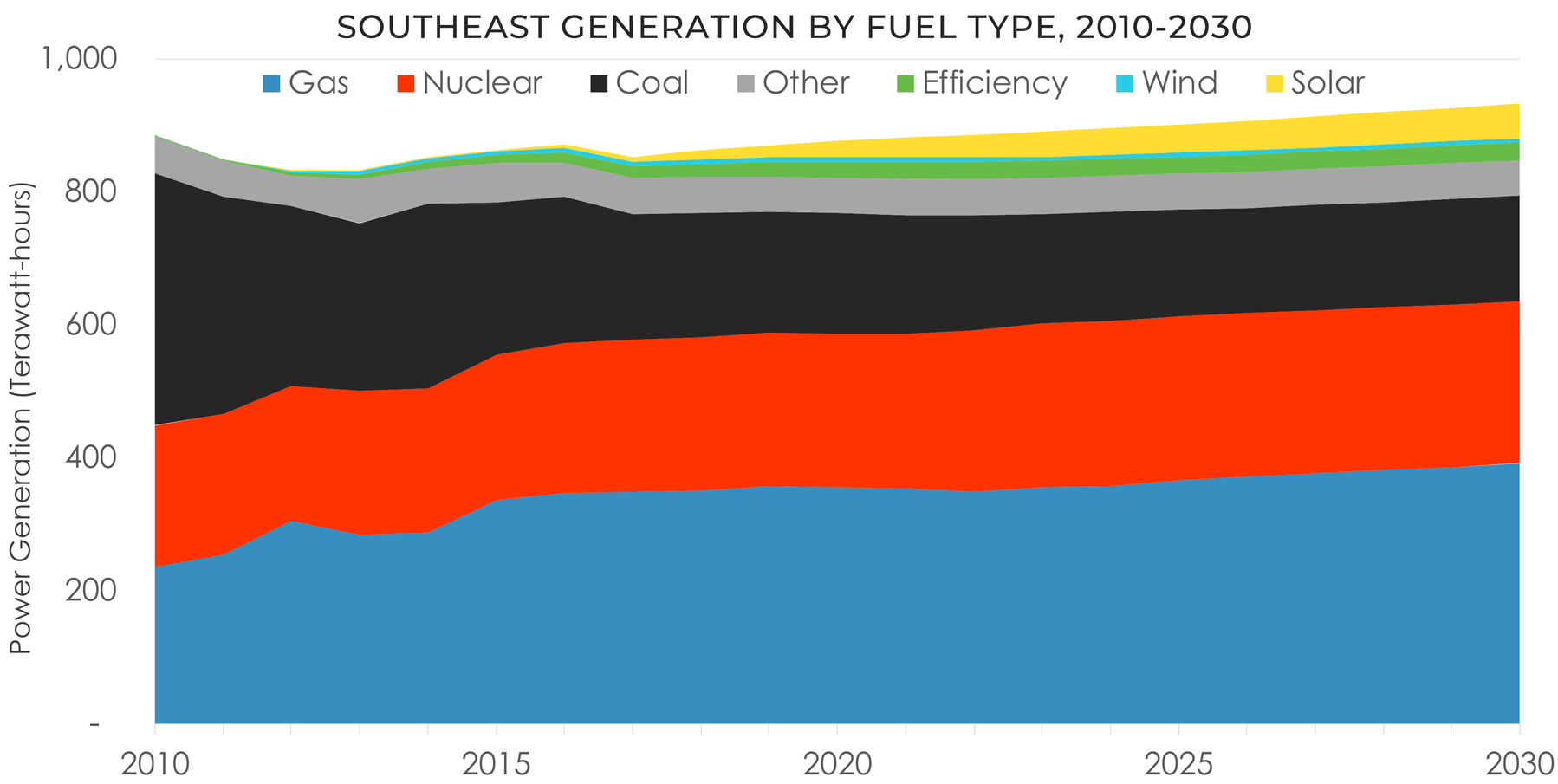
KEY TAKEAWAYS: 90-95% of historical generation has come from coal, fossil gas, and nuclear. The top fuel for power generation has shifted from coal to fossil gas within the past few years. Solar and efficiency's contributions are growing.

OPERATING & PLANNED CAPACITY BY YEAR BUILT



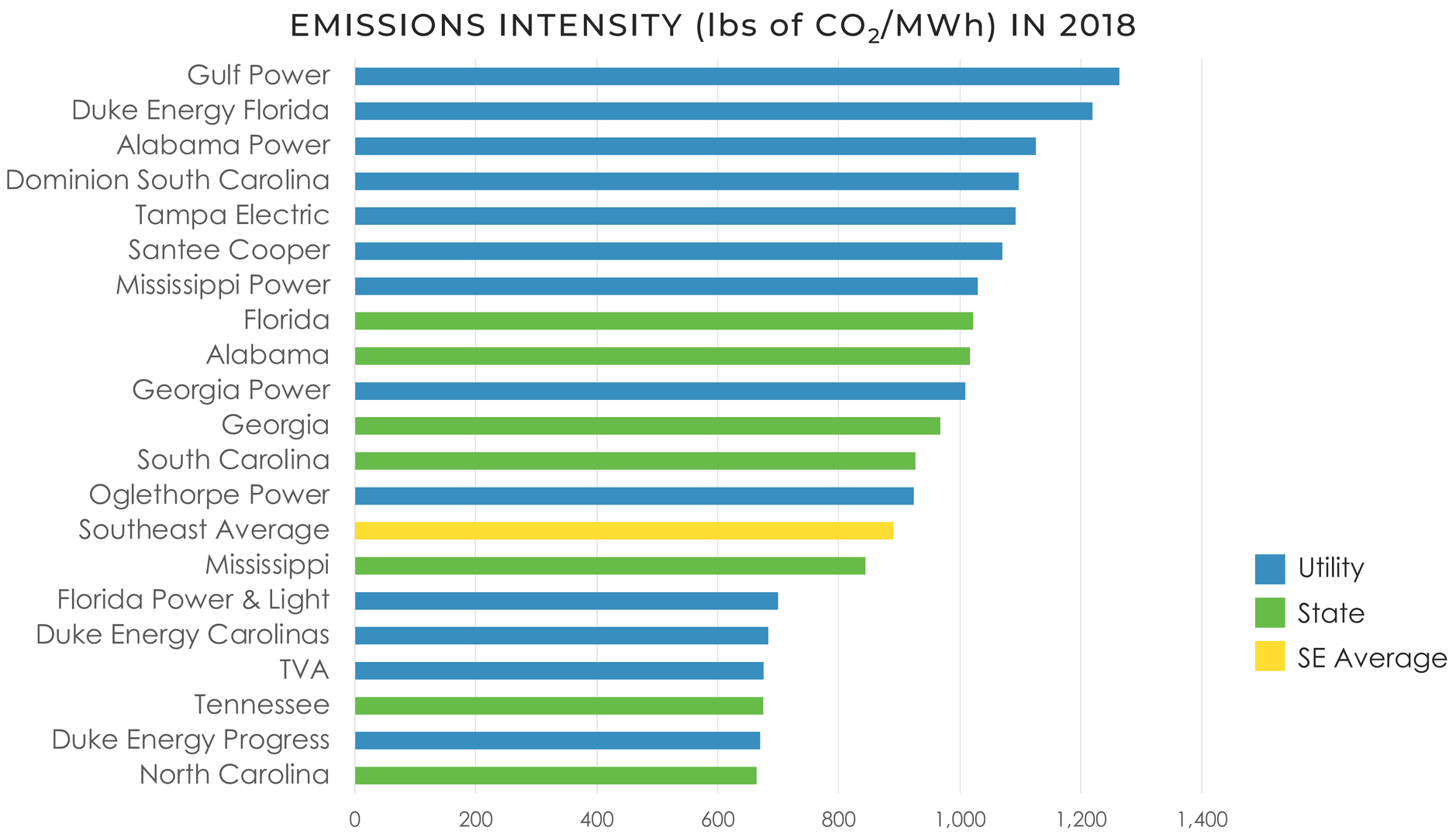
KEY TAKEAWAYS: Fossil gas is still largely the go-to resource for new capacity for utilities in the Southeast, although the favorite resource for utilities has been shown to change over time.

SOUTHEAST GENERATION FORECAST

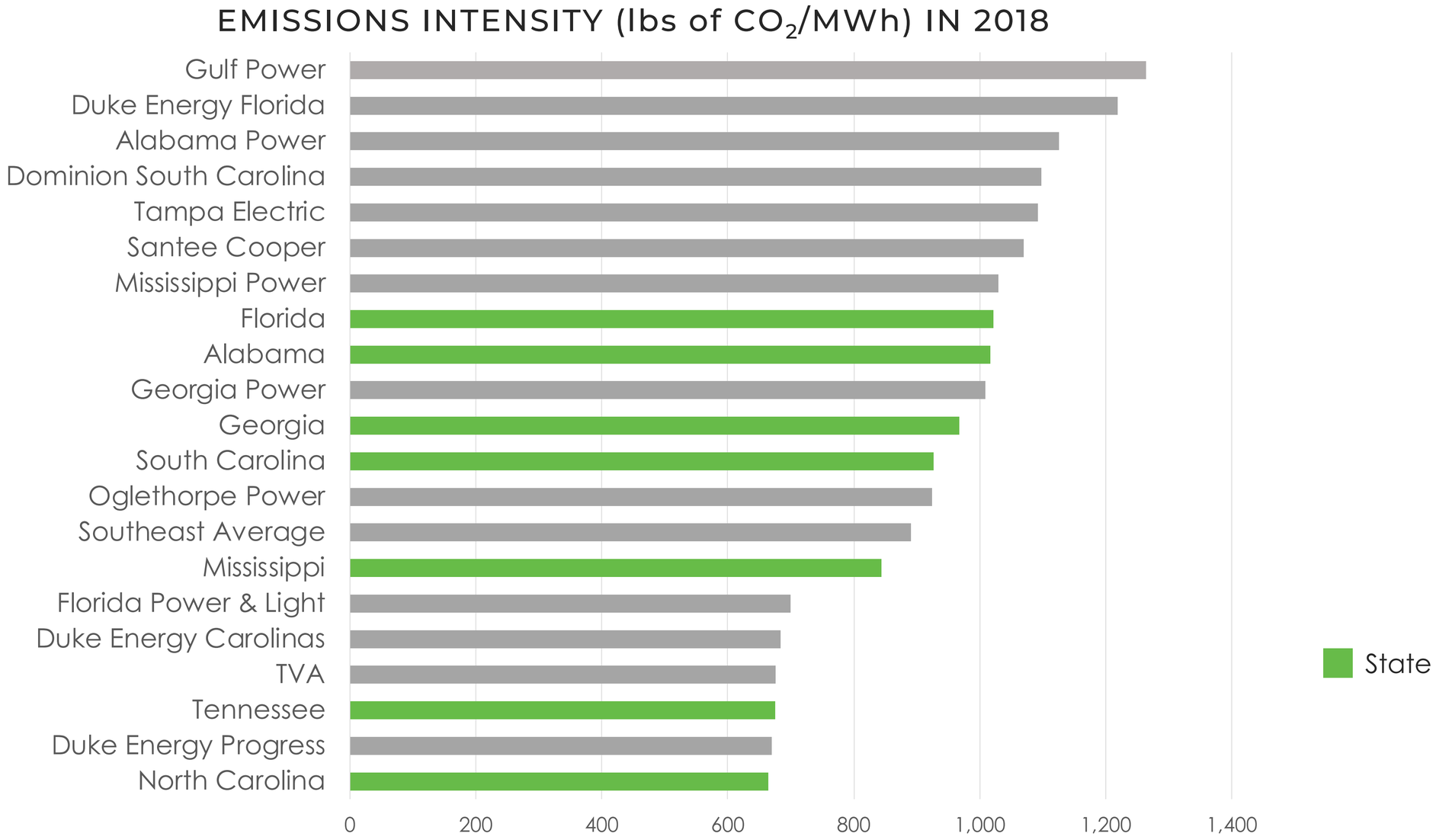


KEY TAKEAWAYS: Utilities expect low to flat load growth over the next decade. Under current utility plans dependence on fossil gas will grow even with continued utility investments in solar. Many utilities have yet to announce retirement dates for coal plants, so current plans show significant coal generation through at least 2030.

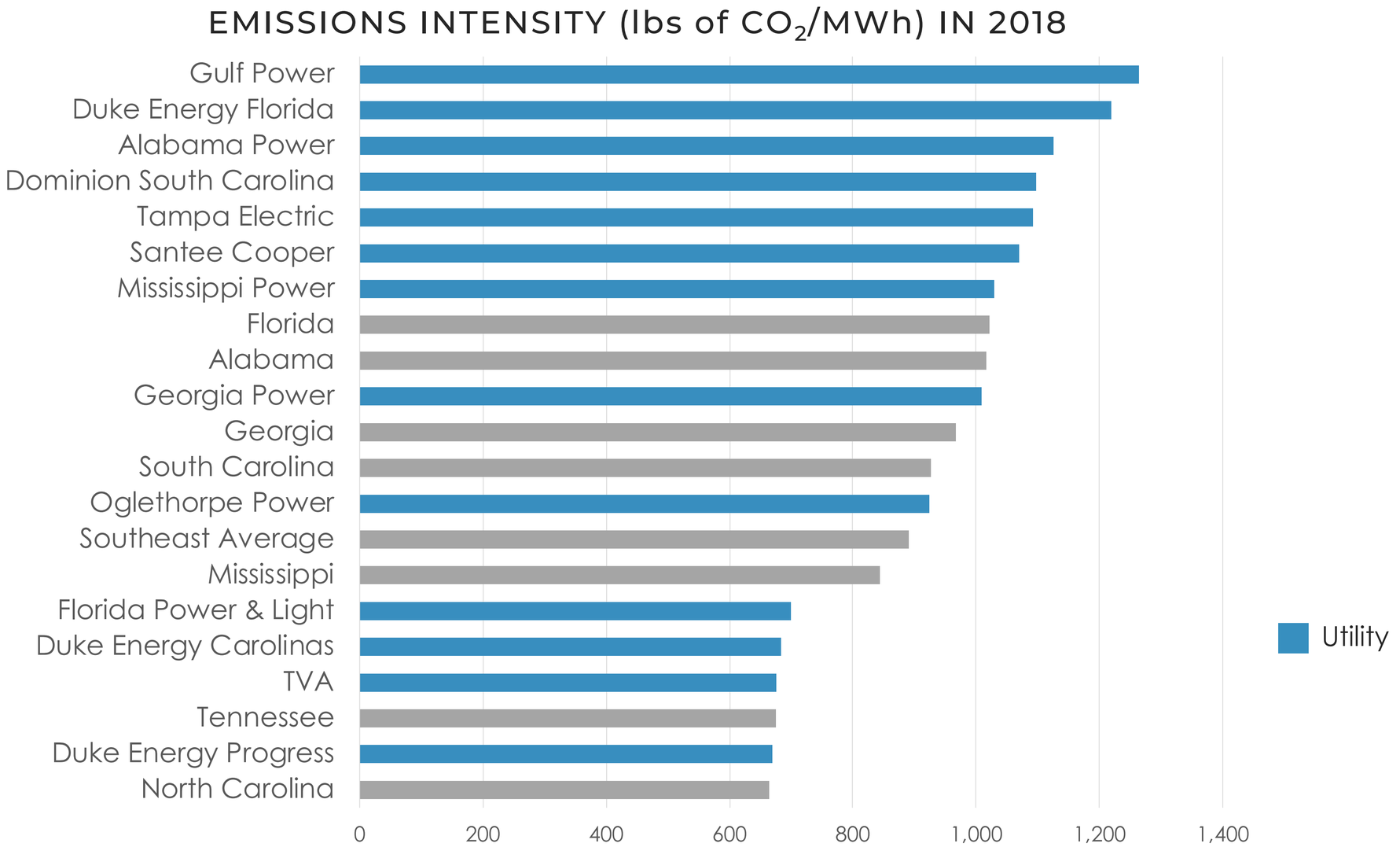
CO_2 INTENSITY OF POWER SUPPLY



CO_2 INTENSITY OF POWER SUPPLY - STATES



CO_2 INTENSITY OF POWER SUPPLY - UTILITIES



ELECTRIC UTILITY CARBON GOALS

DECARBONIZATION FACES MANY CHALLENGES

A growing number of electric utilities and cities in the Southeast have set goals to decarbonize by 2040-2050. Even where goals have been set, there are challenges to realizing these goals and decarbonizing at rates needed to address the climate crisis.

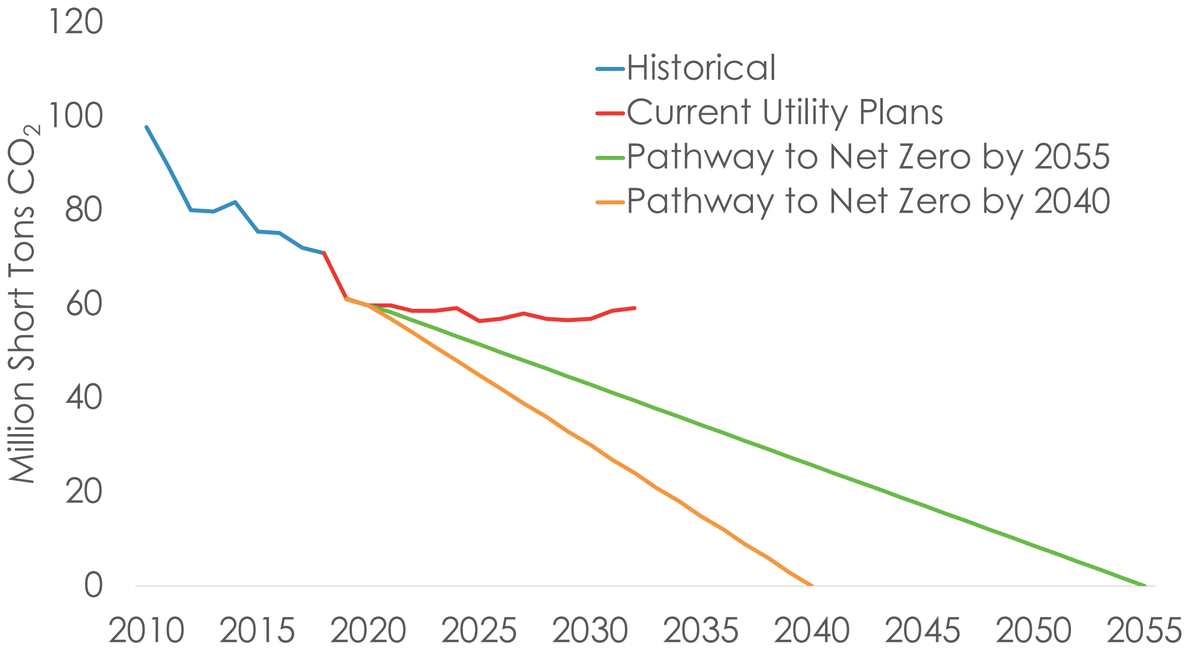
- Inconsistency between goals and actual plans (IRPs)
- Near-term vs. long-term goals need to align with science
- Focus needs to include total CO_2 reduction not just emissions rate
- Goals need to account for power purchases, municipality agreements

HIGHLIGHT: MAJOR SOUTHEASTERN CARBON COMMITMENTS

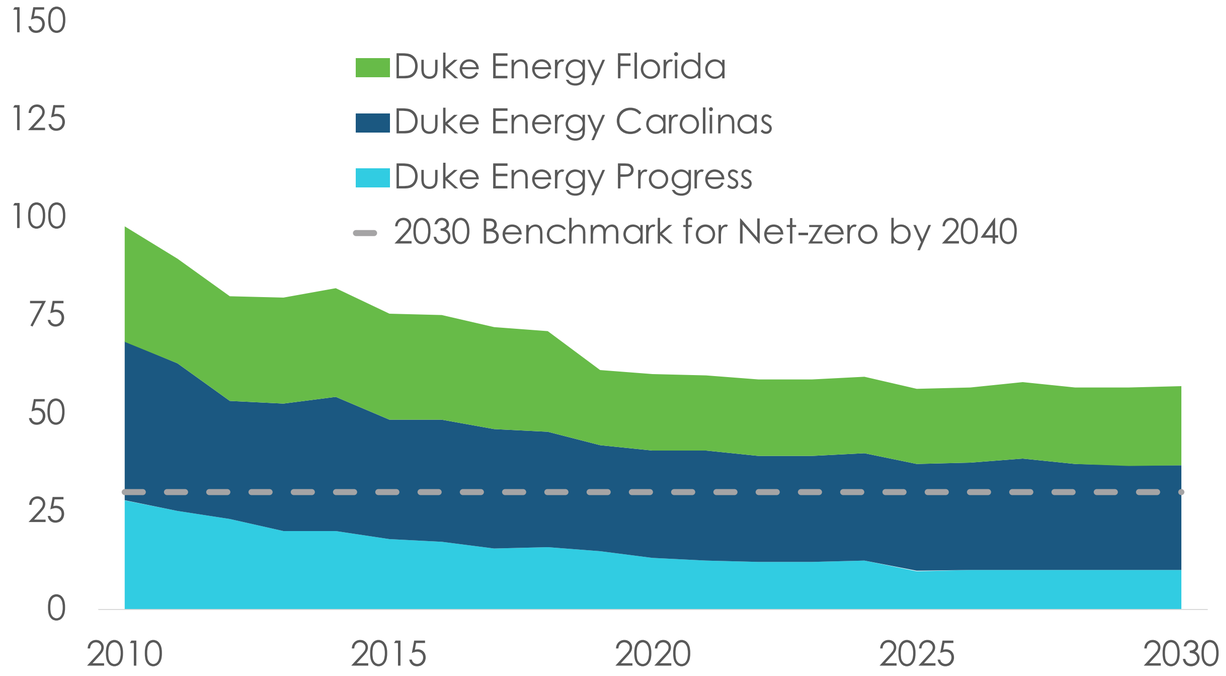
- Southern Company = net-zero by 2050
- Duke Energy = net-zero by 2050
- Orlando = 90% reduction from 2006 levels by 2040
- Tallahassee = 100% renewable energy by 2050

UTILITY HIGHLIGHT: DUKE ENERGY

PLANS VS. NET-ZERO PATHWAYS



CO_2 BY UTILITY UNDER CURRENT PLANS

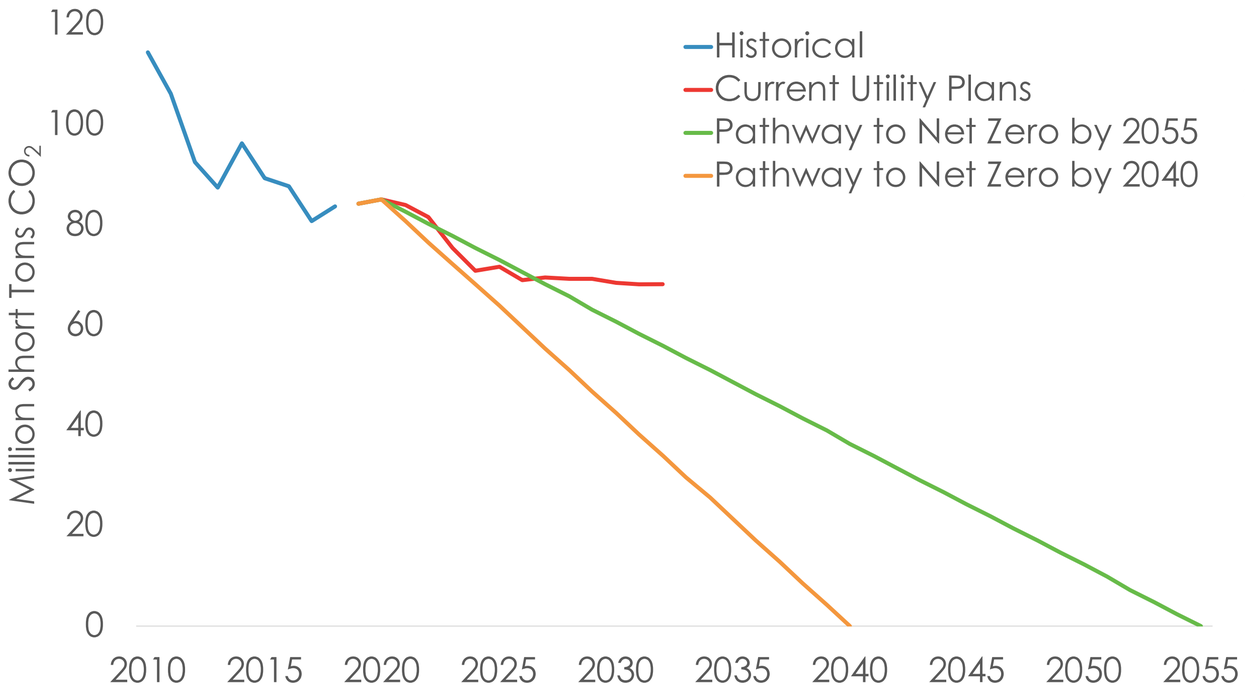


KEY TAKEAWAYS: Duke improved its decarbonization goal by targeting net-zero goal by 2050 and increasing its interim goal from 40% to 50% by 2030. It is on track to meet its 2030 goal, but is behind on net-zero goal due to gas-heavy generation in Florida and remaining coal in the Carolinas.

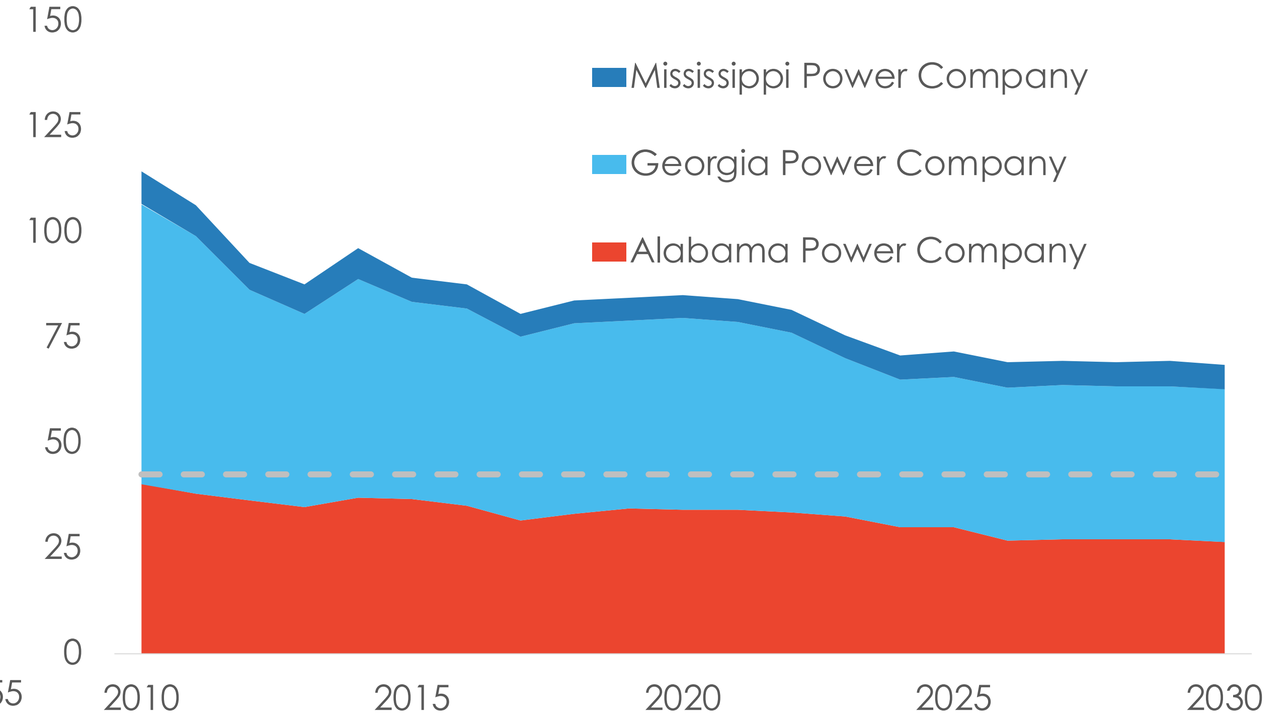
To watch: New Duke resource plan for the Carolinas out Sept. 1 is expected to bring utility closer to "on track" to net-zero goal.

UTILITY HIGHLIGHT: SOUTHERN COMPANY

PLANS VS. NET-ZERO PATHWAYS



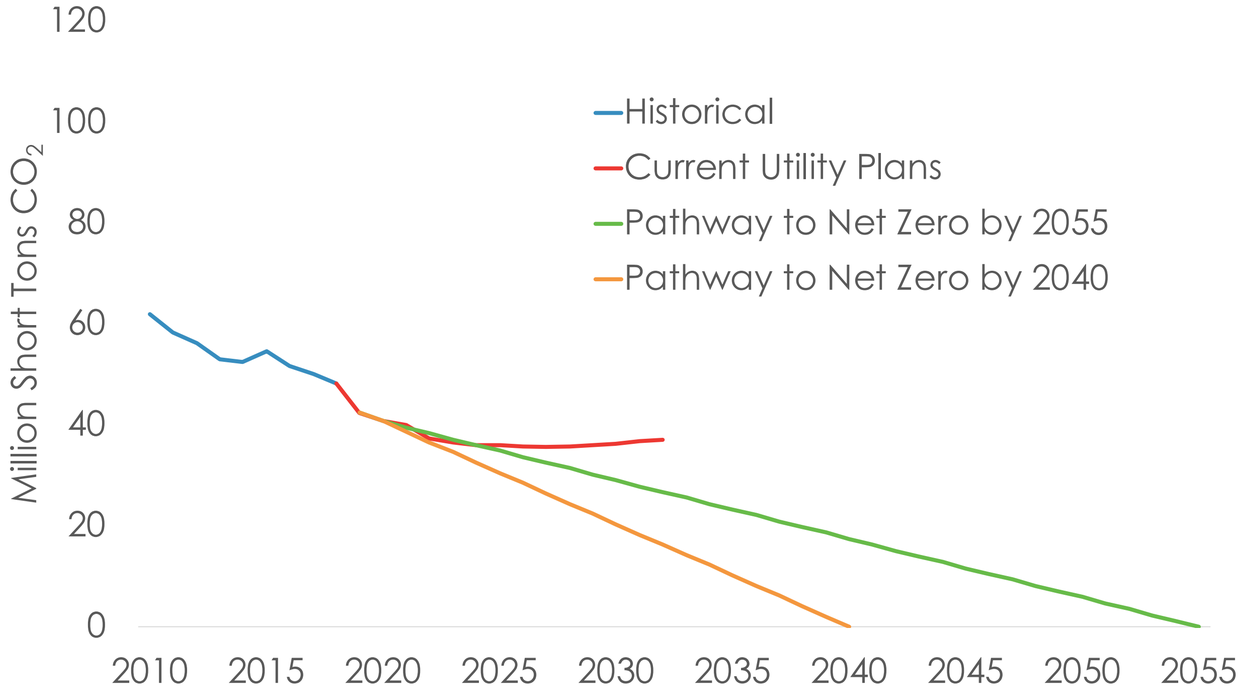
CO_2 BY UTILITY UNDER CURRENT PLANS



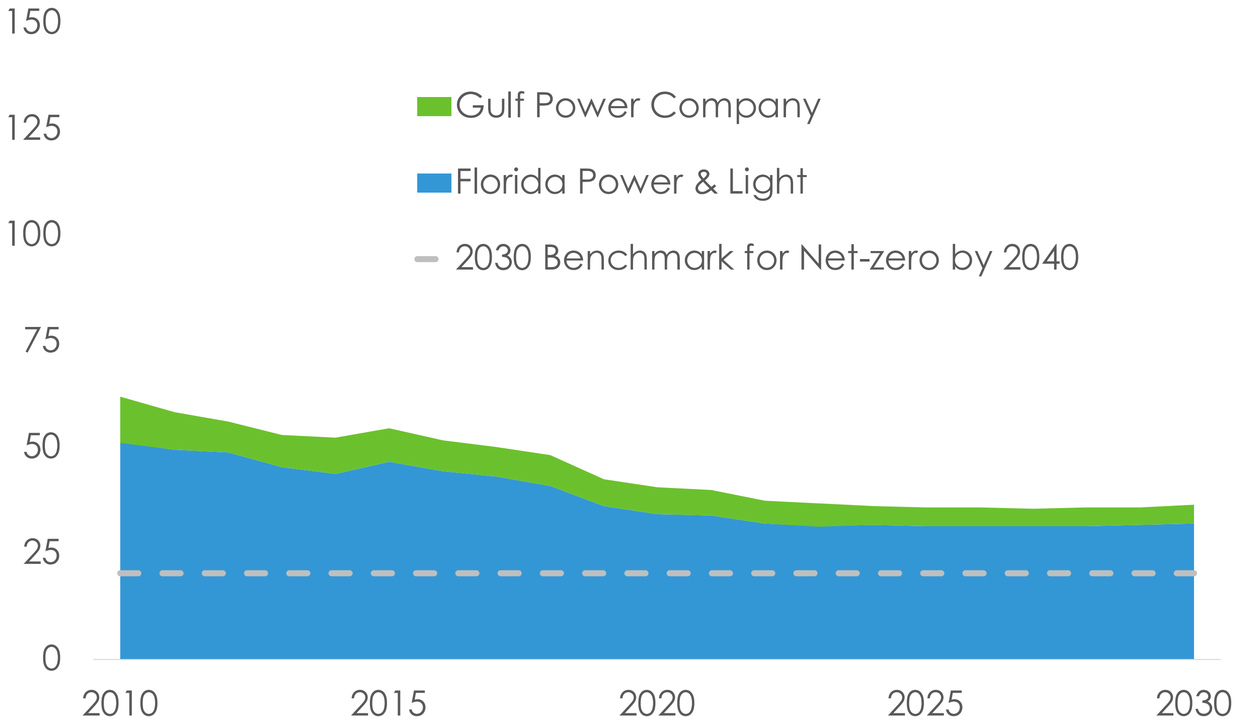
KEY TAKEAWAYS: Southern Company is also on track to meet interim goals, but is not on a trajectory to reach net-zero. It also calculates emissions levels using a 2007 baseline, which is the highest point for utilities in the past 40 years. Coal usage is on the decline in Georgia, though remains a major roadblock for all of Southern's operating companies.

UTILITY HIGHLIGHT: NEXTERA ENERGY

PLANS VS. NET-ZERO PATHWAYS



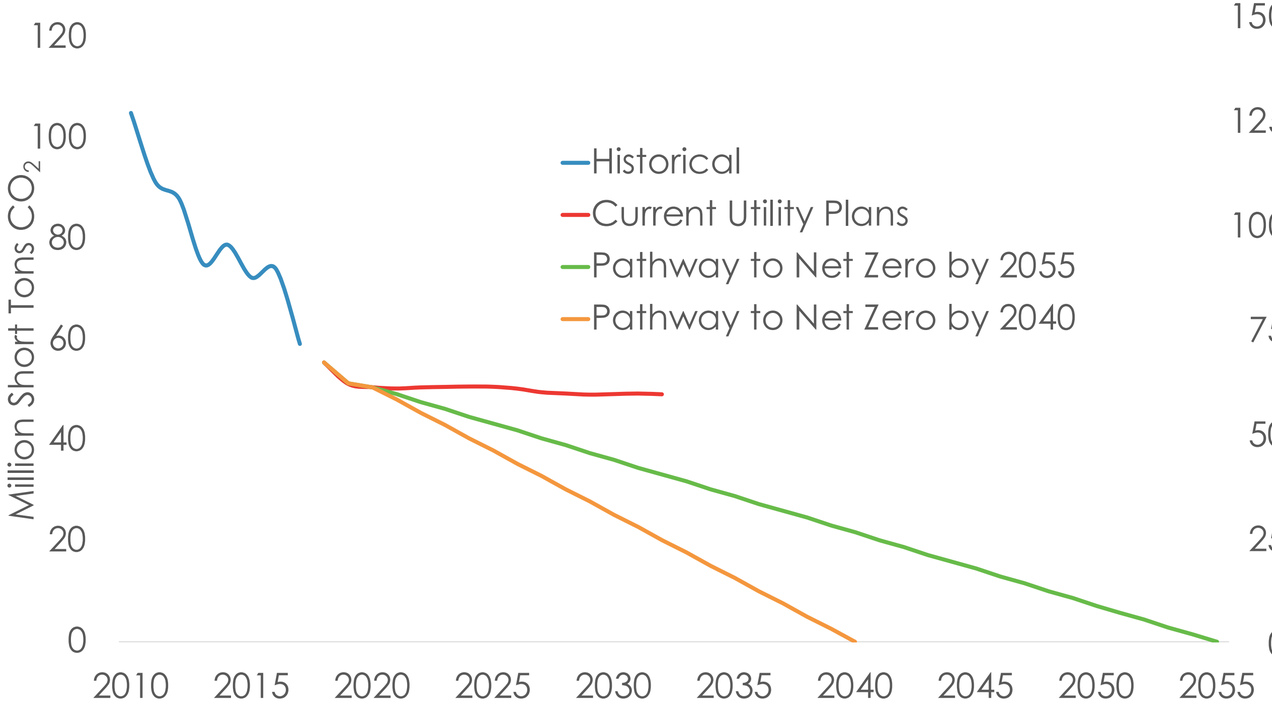
CO_2 BY UTILITY UNDER CURRENT PLANS



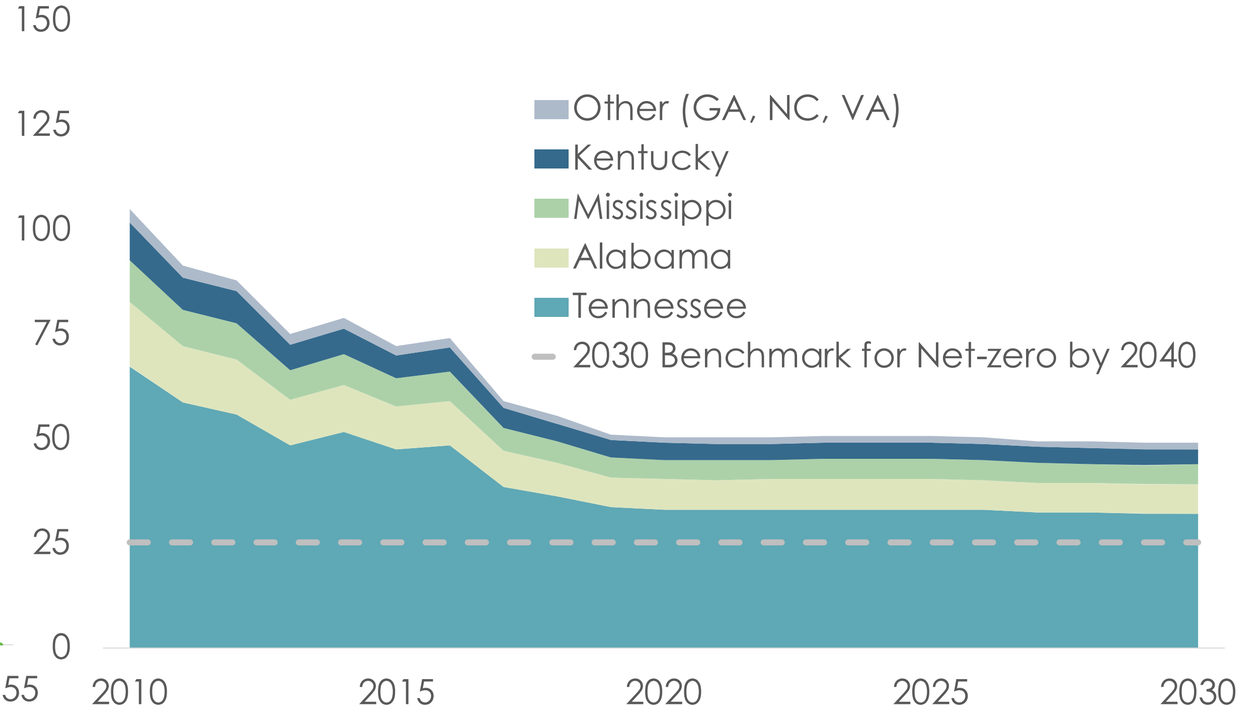
KEY TAKEAWAYS: NextEra energy set targets to reduce its CO_2 emissions rates (lbs / MWh) rather than total carbon emissions. Because NextEra is expanding its geographic footprint with the addition of Gulf Power, this carries the possibility of continued emissions if demand increases.

UTILITY HIGHLIGHT: TENNESSEE VALLEY AUTHORITY

PLANS VS. NET-ZERO PATHWAYS



CO_2 BY STATE UNDER CURRENT PLANS



KEY TAKEAWAYS: TVA has not announced a decarbonization goal. The public utility has achieved significant reductions during the past decade due to coal retirements and lower load forecasts, though current plans do not reflect a continuation of emission reductions.

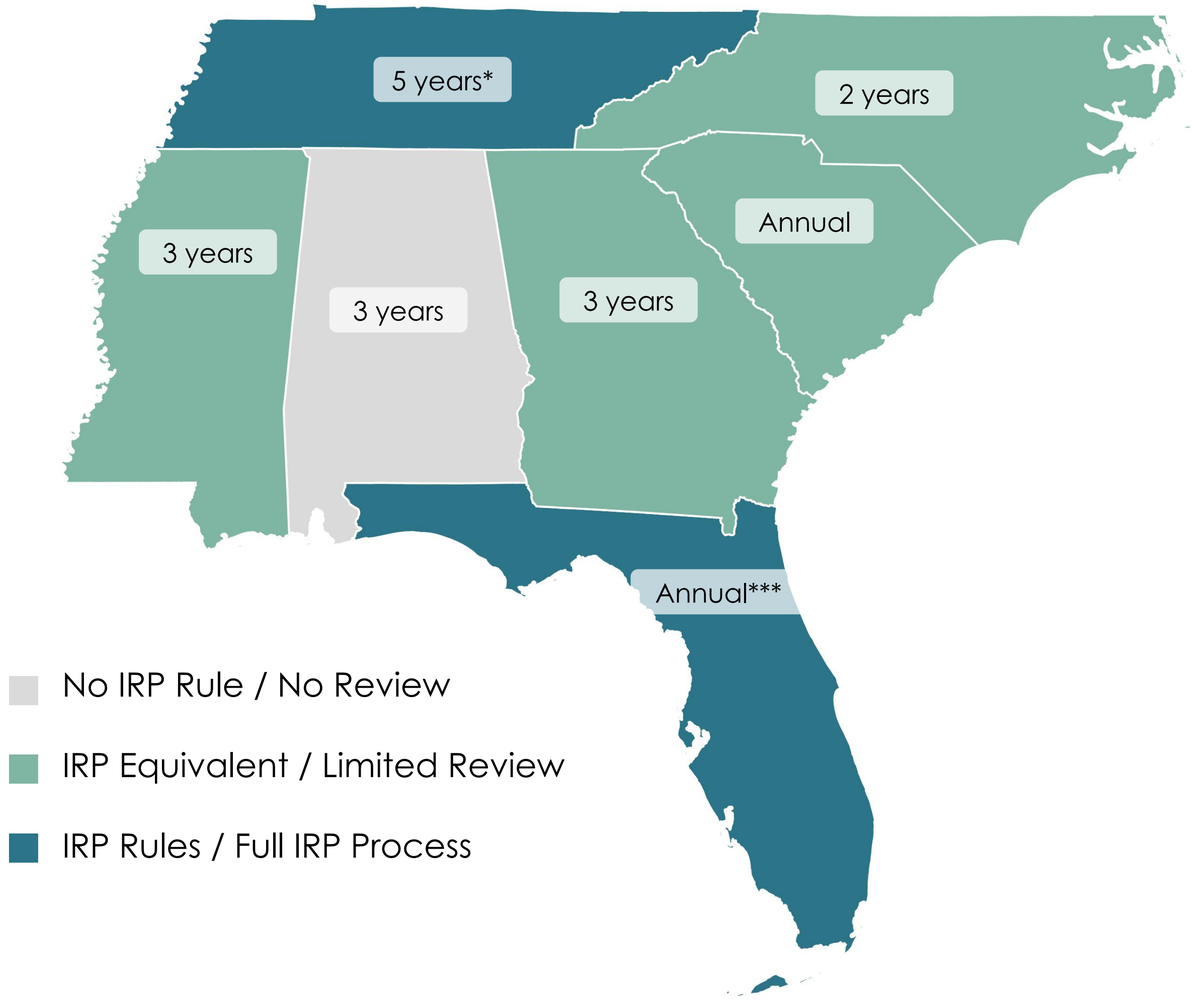
ONGOING OPPORTUNITIES FOR EMISSIONS REDUCTIONS

RESOURCE PLANNING

KEY TAKEAWAYS: Resource planning is a key opportunity for utilities to make good on decarbonization goals. Each state sets it own IRP rules regarding frequency and need for public review.

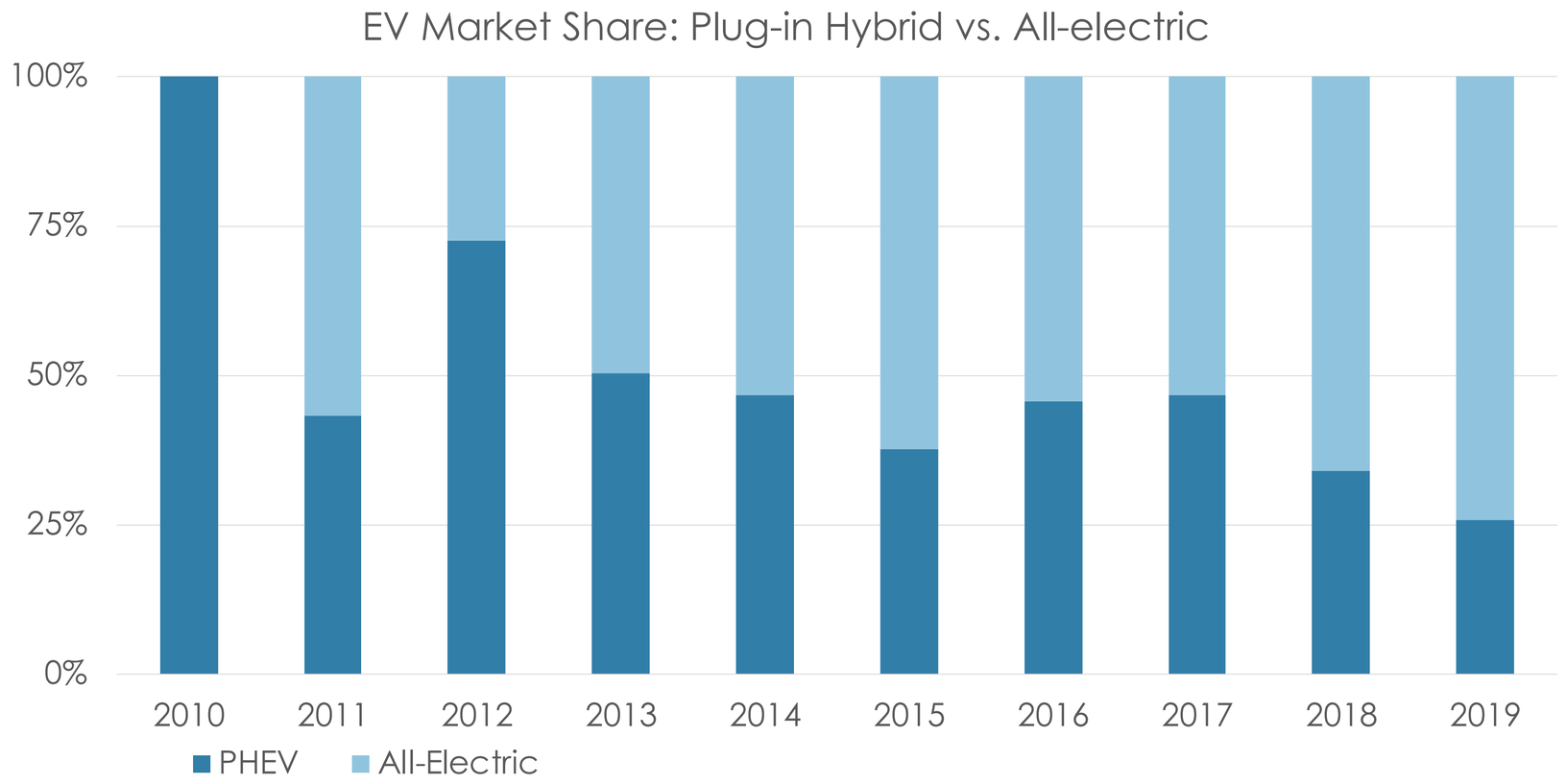
**TVA policy is to update its IRP at least every five years though the span between recent IRPs was three years.

***Florida utilities submit ten-year site plans, which serve a function similar to IRPs but are not integrated with demand-side planning and do not include meaningful public participation.



ONGOING OPPORTUNITIES FOR EMISSIONS REDUCTIONS

ELECTRIC TRANSPORTATION



Source: Oak Ridge National Laboratory - Transportation Energy Data Book

KEY TAKEAWAYS: All-electric EVs are becoming more popular and taking up a larger part of the market share for electric vehicles. Since EVs plug into the utility grid, a cleaner power supply means each EV will also run cleaner too.

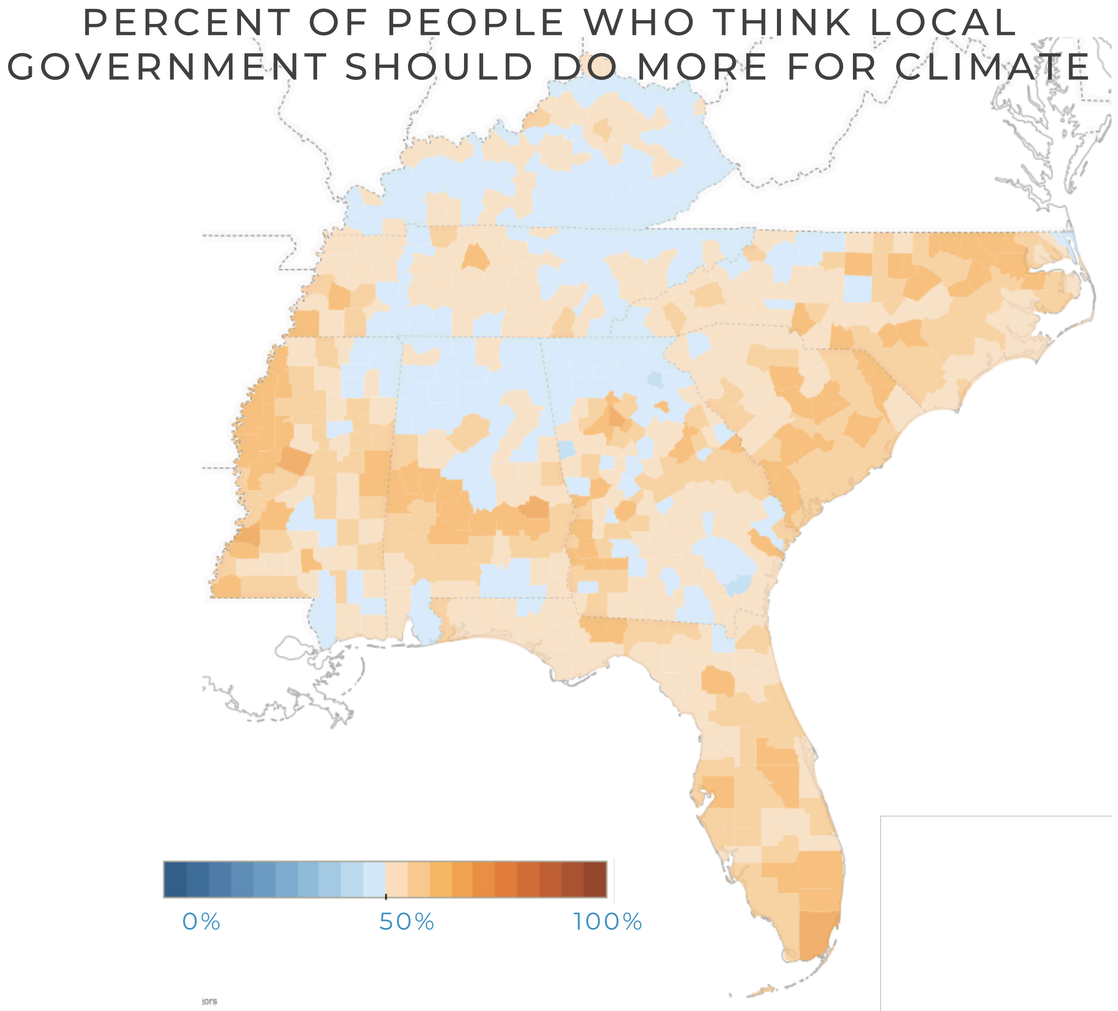
ONGOING OPPORTUNITIES FOR EMISSIONS REDUCTIONS

LOCAL GOVERNMENT POLICY

KEY TAKEAWAYS:

Local governments are an opportunity for high-impact emissions reductions outside of utility decarbonization goals, although there are challenges for municipalities.

An increasing number of cities are setting goals, and the majority of the Southeast thinks their local government should do more to address climate change.



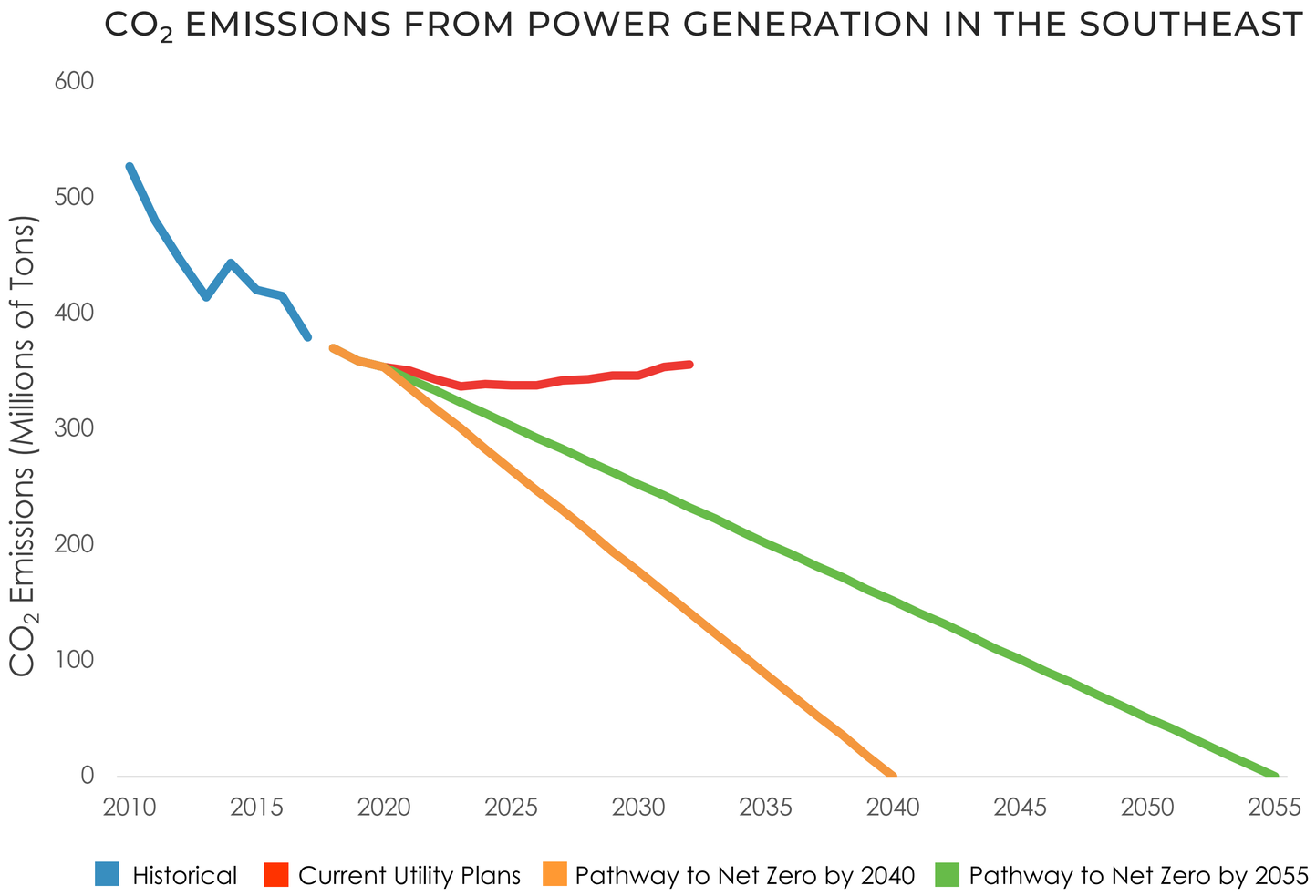
EMISSION TRENDS AND THE CLIMATE CRISIS

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

Unless utilities make significant changes to their current plans, the Southeast electric sector is not on track to reduce emissions on the trajectory needed to avoid the worst of the climate crisis.



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DATA SOURCES, METHODS & ASSUMPTIONS

The primary source for Southeastern generation, capacity, and fuel type for plants and units are reported directly by utilities to the U.S. Energy Information Administration (EIA) in Forms EIA 860 (Annual Electric Generator Data), EIA 861 (Annual Electric Power Industry Report), and EIA 923 (Annual Electric Utility Data). These are supplemented by public domain sources, including other federal data or guidance documents, utility resource plans, utility press releases, security commission filings, and the professional judgment of SACE staff.

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 and peak demand forecasts are obtained from FERC 714 (Annual Electric Balancing Authority Area and Planning Area Report).

Emissions are calculated based on fuel use and US 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). Emissions are presented in short tons.

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 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.

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.

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

- Southern Alliance for Clean Energy (2019). *Solar in the Southeast, Third Annual Report.*
- Southern Alliance for Clean Energy (2018). *Energy Efficiency in the Southeast, 2019 Annual Report.*