

# REINHOLD ENVIRONMENTAL®

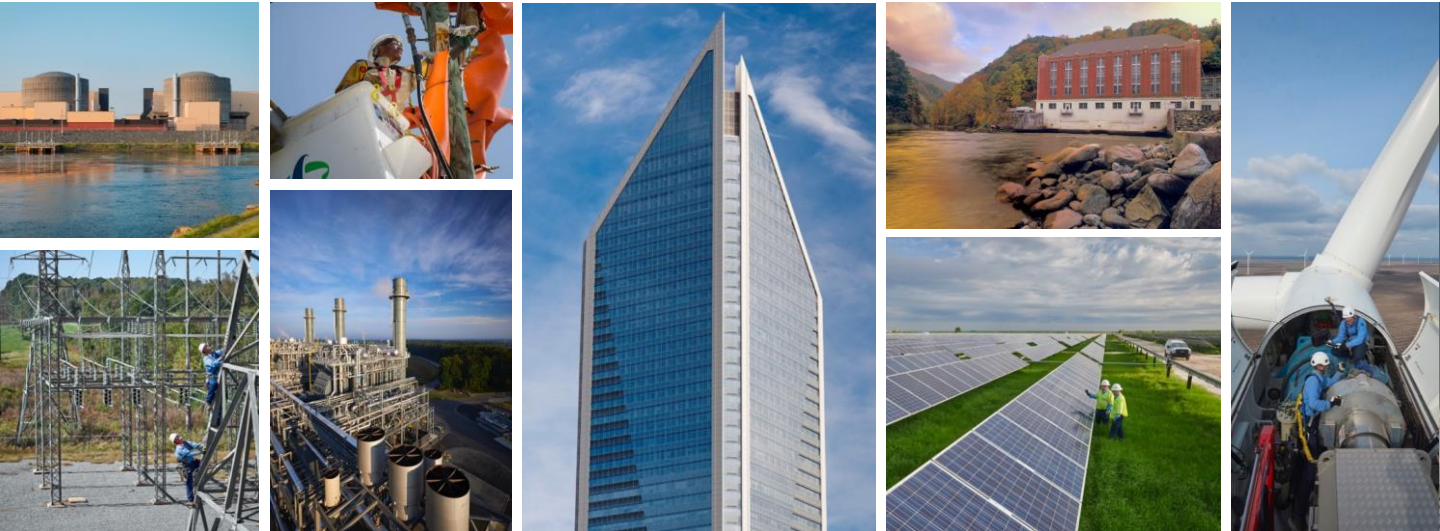


## **2022 Reinhold/PCUG Round Table Presentation**

Hosted by Duke Energy in the Charlotte Sheraton/Le Meridien  
Hotel, Charlotte, NC on June 27-28, 2022

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# Duke Energy and the Clean Energy Transition – Perspectives on Air Quality, Carbon Plans and ESG



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# Duke Energy – a large scale, highly regulated energy infrastructure company

HEADQUARTERED IN  
CHARLOTTE, NC



A FORTUNE 150 COMPANY

**\$87 B**

MARKET CAP  
(AS OF 5/31/22)

**\$171 B**

TOTAL ASSETS  
(AS OF 3/31/22)

**28 K**

EMPLOYEES  
(AS OF 12/31/2021)

**54 GWs**

TOTAL GENERATING  
CAPACITY (AS OF 3/31/22)

## ELECTRIC UTILITIES & INFRASTRUCTURE



## GAS UTILITIES & INFRASTRUCTURE



## COMMERCIAL RENEWABLES



- Operating in six constructive jurisdictions, with attractive allowed ROEs, serving 8.2 million retail customers
- Balanced generation portfolio that has reduced its carbon emissions by 44% since 2005<sup>(1)</sup>
- Industry-leading safety performance, as recognized by EEI
- Five state LDCs serving 1.6 million customers
- Strong earnings trajectory driven by customer growth, system integrity improvements, and continued expansion of natural gas infrastructure
- Efficient recovery mechanisms allow for timely recovery of investments
  
- Approximately 5 GWs of wind and solar in operation
- Long-term Power Purchase Agreements with creditworthy counterparties

<sup>(1)</sup> Year to year reductions will be influenced by customer demand for electricity, weather, fuel and purchased power costs and other factors.

# Duke Energy is leading the industry's largest clean energy transition

## What we're doing



### Completing the largest planned coal retirement in the industry

- Retired 56 units (7.5 GW) since 2010
- Coal generation projected to be <5% fuel mix by 2030
- Goal to exit coal generation by 2035<sup>(1)</sup>



### Expanding our renewable resources

- Top 10 US renewable company by capacity, with operations in 25 states
- Passed 10 GW owned, operated or purchased in 2021, targeting 24 GW by 2030



### Targeting net-zero emissions by 2050

- Reduced carbon emissions 44% since 2005, on pace to exceed 50% reduction by 2030 and net zero by 2050 (Scope 1)
- Net zero methane emissions by 2030 (Scope 1)
- Updating net-zero goal to include Scope 2 and certain Scope 3<sup>(2)</sup> emissions for electric and gas utilities

## How we're doing it



### Collaborating with state and federal policymakers

- Landmark bipartisan legislation in NC that accelerates our clean energy transition
- Engaging policymakers and regulators to advance shared objectives for clean energy



### Integrated resource plans that match our climate goals

- Significant stakeholder engagement on jurisdictional IRPs & Carbon Plan
- Balancing affordability and reliability priorities on behalf of our customers



### Executing our plan

- Constructive rate cases that accelerate coal retirements and call for more renewables
- Extending the life of the largest regulated nuclear fleet in the country<sup>(3)</sup>
- Managing through supply chain issues
- Leveraging our size and scale to efficiently finance our robust capital plan

<sup>(1)</sup> Subject to regulatory approvals. Contemplates retiring Edwardsport coal gasifiers by 2035 or adding carbon capture utilization and storage to reduce carbon emissions

<sup>(2)</sup> Certain scope 3 emissions include: greenhouse gas emissions from upstream fossil fuel procurement used for generation, production of power purchased for resale, and from downstream use of sold products in our natural gas distribution business

<sup>(3)</sup> Subject to NRC approval

## Pop Quiz Question

- How would you rate the air quality now compared to 1980?
  - A. It is far worse now
  - B. It is somewhat worse
  - C. It is about the same
  - D. It is somewhat better
  - E. It is far better



# Air Quality

Progress To Date –  
A look at US EPA data



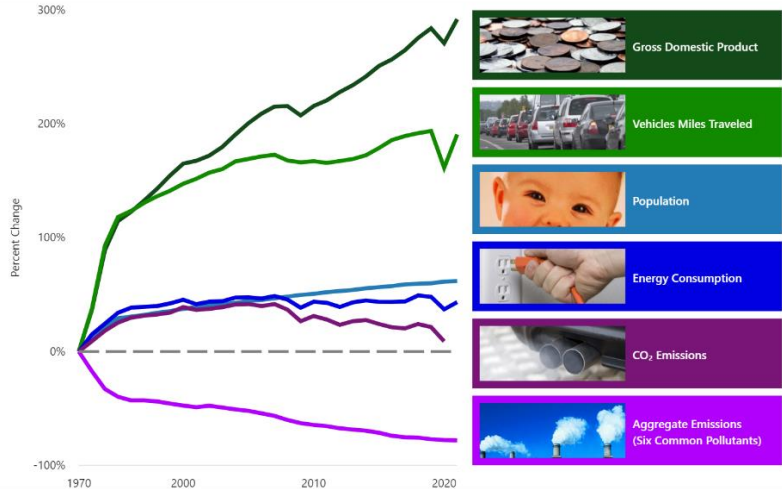
# Air Quality Trends Show Substantial Progress

Nationally, concentrations of air pollutants have dropped significant since 1990:

Carbon Monoxide (8-Hour): 79%  
 Lead (3-Month Avg): 85%\*  
 Nitrogen Dioxide (Annual): 61%  
 Nitrogen Dioxide (1-Hour): 54%  
 Ozone (8-Hour): 21%  
 PM10 (24-Hour): 32%  
 PM2.5 (Annual): 37%\*  
 PM2.5 (24-Hour): 33%\*\*  
 Sulfur Dioxide (1-Hour): 91%

\*From 2010  
 \*\*From 2000

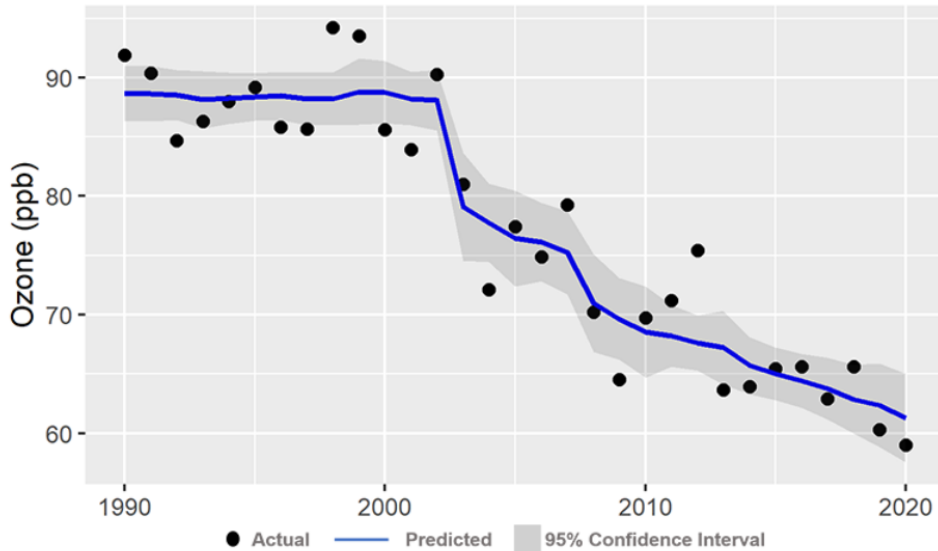
Comparison of Growth Areas and Declining Emissions  
 1970-2021



# Ozone Air Quality Show Long-Term Improvement

## Ozone Figures

Shifts in 8-Hour Seasonal Rural Ozone Concentrations in CSAPR NO<sub>x</sub> Ozone Season and CSAPR Update Regions, 1990-2020



Notes:

- Ozone concentration data are an average of the 99<sup>th</sup> percentile of the 8-hour daily maximum ozone concentrations measured at rural CASTNET sites that meet completeness criteria and are located in or adjacent to the CSAPR NO<sub>x</sub> Ozone Season and CSAPR Update regions.

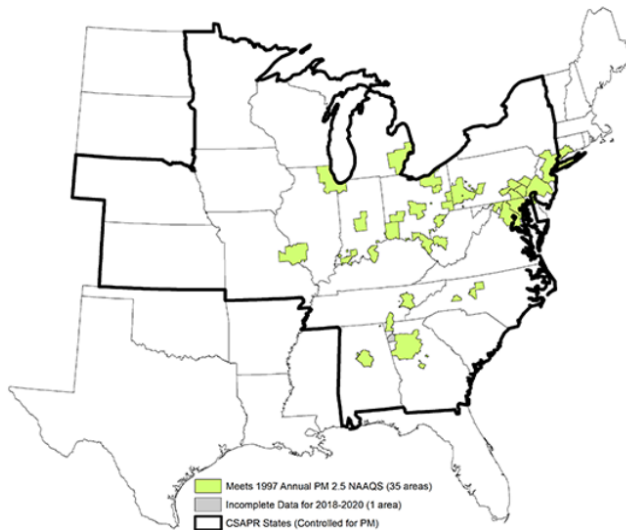
Source: EPA, 2021

Last updated: 01/2022

# Reducing Fine Particulate (PM 2.5)

## Particulate Matter Figures

Changes in 1997 Annual PM<sub>2.5</sub> NAAQS Nonattainment Areas in CSAPR States, 2001–2003 (Original Designations) versus 2018–2020



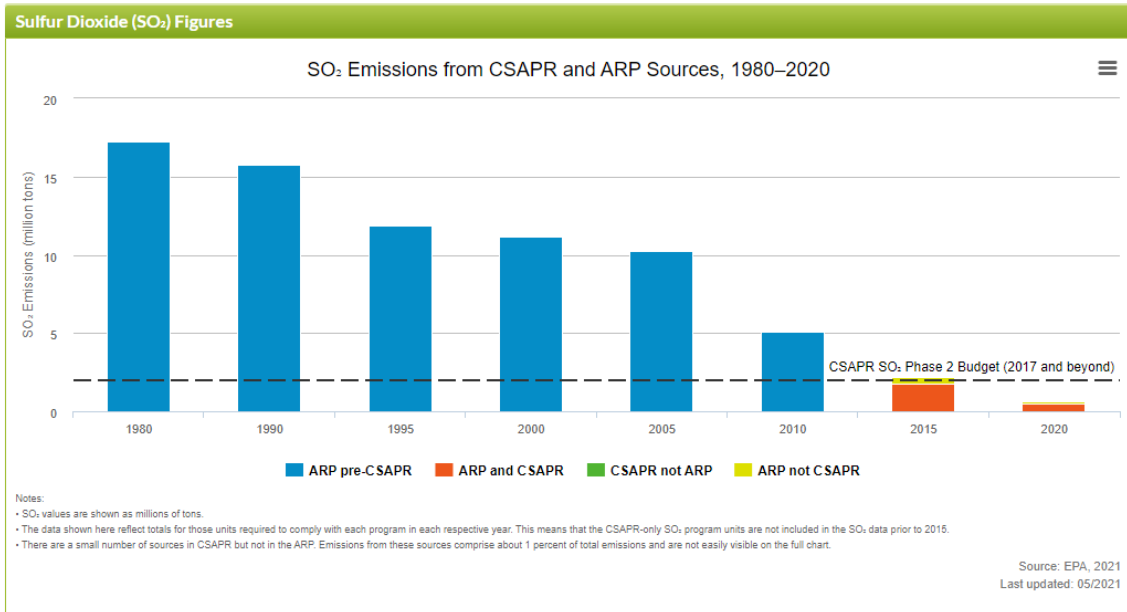
Source: EPA, 2021  
Last updated: 12/2021

# Electric Generating Unit SO<sub>2</sub> Emission Trends 1980-2020

CSAPR - 497,000 tons (94 percent below 2005)

ARP - 778,000 tons (95 percent below 1990)

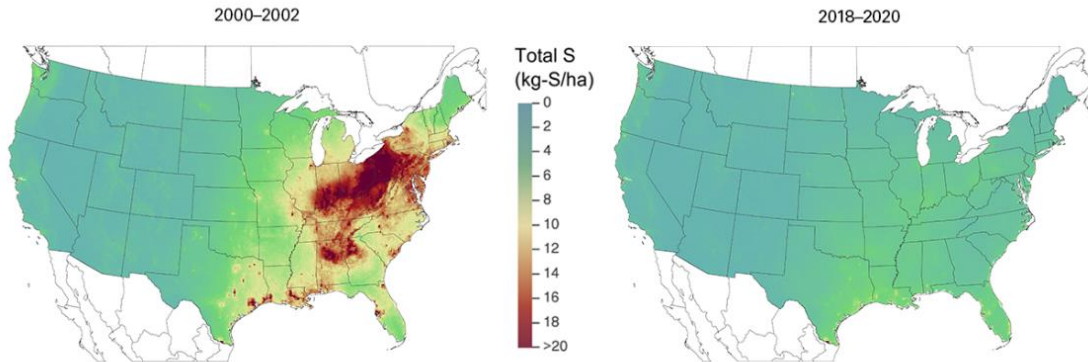
## Emission Reductions



# Improvement in Sulfur Deposition Trends

## Acid Deposition Figures

### Three-Year Average of Total Sulfur Deposition



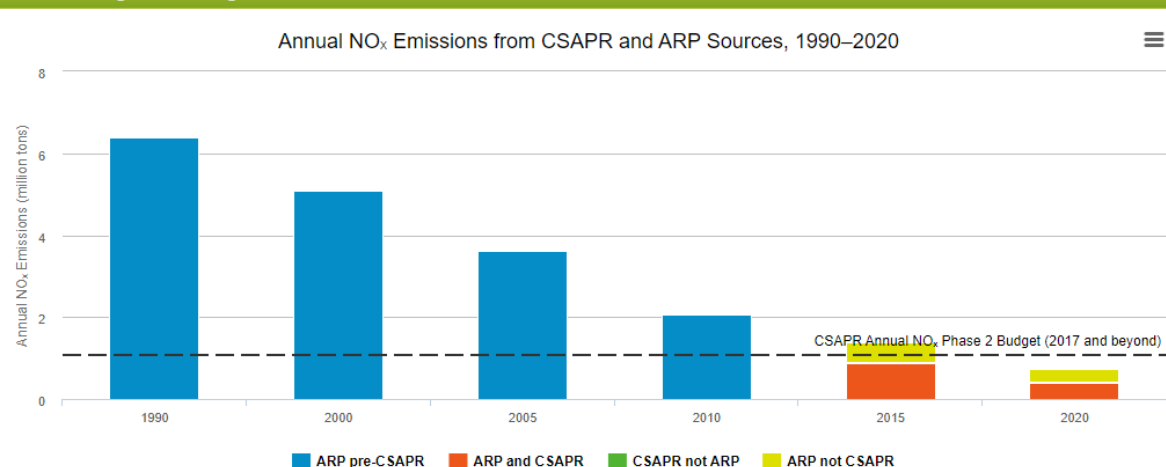
Source: CASTNET/CMAQ/NADP  
USEPA, 2021

Last updated: 01/2022

# Electric Generating Unit NO<sub>x</sub> Emission Trends

- Acid Rain Program NO<sub>x</sub> emissions: 721,000 tons (86 percent below 2000)
- Annual CSAPR NO<sub>x</sub> emissions: 405,000 tons (81 percent below 2005)
- CSAPR O<sub>3</sub> season NO<sub>x</sub> Emissions: 232,000 tons (49 percent below 2015)

## Annual Nitrogen Oxides Figures



### Notes:

- NO<sub>x</sub> values are shown as millions of tons.
- The data shown here reflect totals for those units required to comply with each program in each respective year. This means that the CSAPR-only NO<sub>x</sub> program units are not included in the NO<sub>x</sub> data prior to 2015.
- There are a small number of sources in CSAPR but not in the ARP. Emissions from these sources comprise about 1 percent of total emissions and are not easily visible on the full chart.

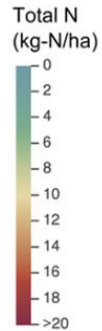
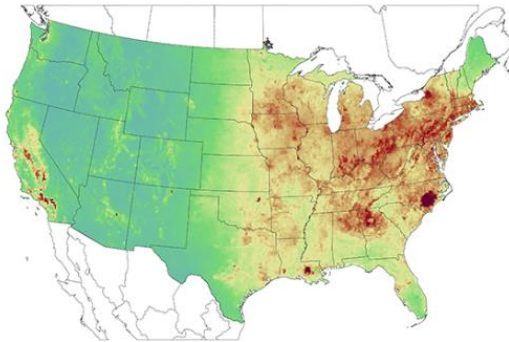
Source: EPA, 2021  
Last updated: 05/2021

# Improvement in Total Nitrogen Deposition Trends

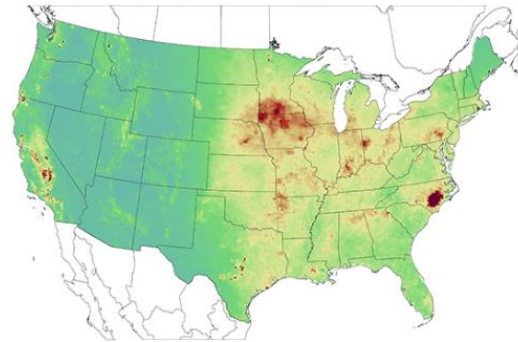
## Acid Deposition Figures

### Three-Year Average of Total Nitrogen Deposition

2000–2002



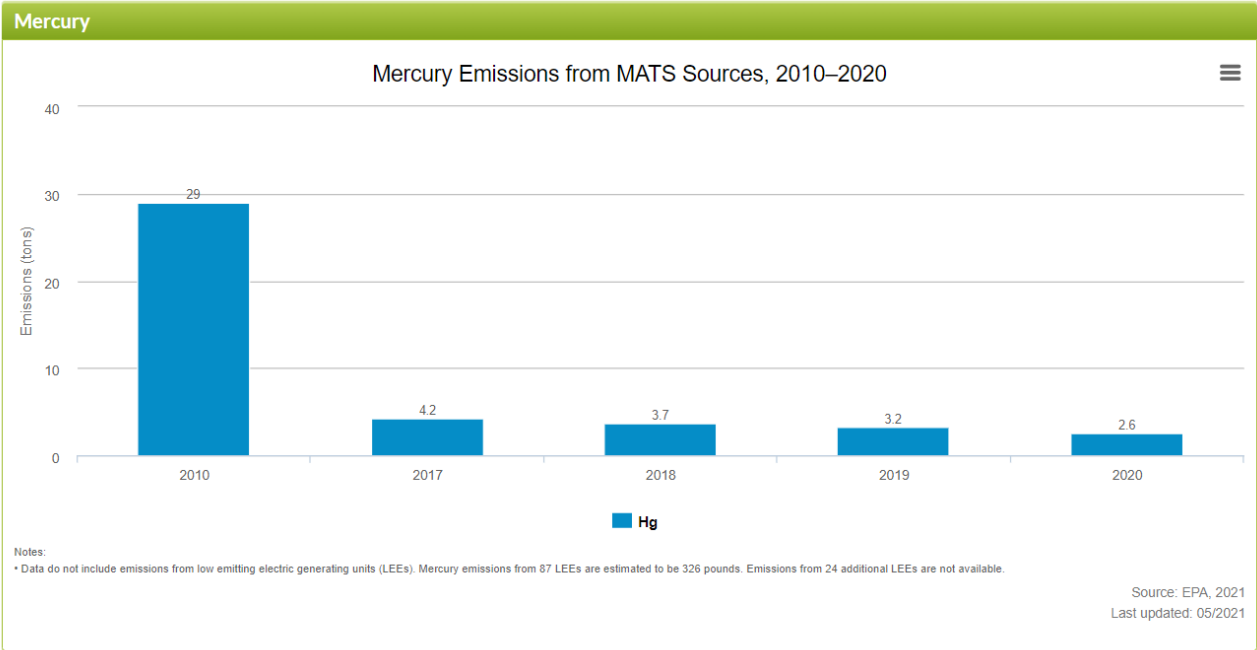
2018–2020



Source: CASTNET/CMAQ/NADP  
USEPA, 2021

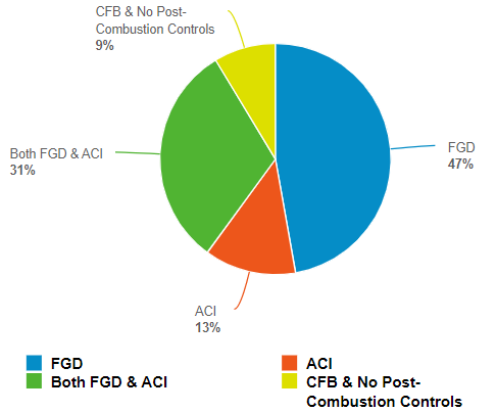
Last updated: 01/2022

# Success of the MATS Rule

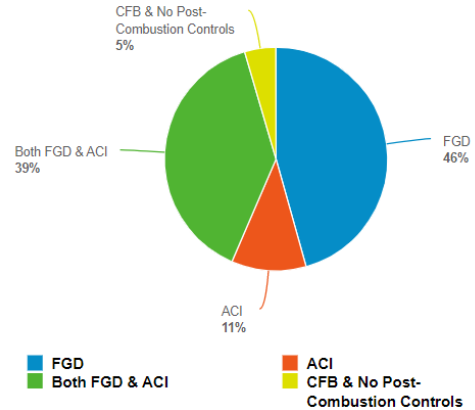


# Mercury Controls at MATS-Affected Sources, 2020

Mercury Controls on MATS Covered Units (units)



Mercury Controls on MATS Covered Units (MWh) ☰



Notes:

- Percent totals may not add up to 100 percent due to rounding
- This data is from the MATS-affected sources that submitted hourly emissions data to EPA. Units not reporting data (e.g. those monitoring using periodic testing) are not included in this report.

Source: EPA, 2021  
Last updated: 05/2021

# Pending Major Regulatory Initiatives - Air

- Proposed CSAPR FIP Rule
  - Comment period closed on June 21, 2022
  - Extensive changes proposed to further restrict the trading program
  - Include regulations for a number of non-EGU categories
  - Anticipated to take effect for the 2023 ozone season
- CT MACT
  - EPA lifted its stay for the 2004 rule's requirements for new lean premix and diffusion flame combustion turbines.
  - Units must demonstrate compliance within six months (Sept 5, 2022)
- MATS
  - January 31, 2022, EPA proposed to reinstate its “Necessary and Appropriate” finding for MATS
- CO2 Litigation
  - Awaiting Supreme Court's decision on West Virginia vs EPA (any day)
  - Major Issue: Did Congress authorize EPA to decarbonize the economy
  - EPA is considering its next steps, but it too is waiting

# Pending Major Regulatory Initiatives – Water

- Steam Electric Effluent Limits Guidelines Supplemental Rulemaking
- Duke Energy units are already compliant with current rules
- EPA proposing to revise current rule
  - Proposed rule – November 2022
  - Final Rule – Fall 2023
- Potential rule revisions<sup>1</sup>
  - FGD – zero discharge (membrane filtration and/or thermal treatment)
  - Bottom Ash – zero discharge with purge volume restrictions
  - Leachate – treatment technology
  - Legacy – treatment technology
  - 2020 Rule Subcategories (removal or modification)
    - High flow FGD blowdown
    - Low utilization units
    - Cessation of coal combustion

<sup>1</sup> Based on 1/27/2022 Federalism/Unfunded Mandates Reform Act (UMRA) Consultation Meeting

# Environmental Justice

**Environmental justice** is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. (EPA)

EJ continues to be gaining attention with regulators, policy makers and the public.

Examples of recent regulatory attention:

- EPA Strategic Plan 2022-26
- FERC pipeline reviews
- White House Justice40 initiative and Climate & Economic Justice screening tool
- EJ and Air Permitting Examples:
  - Covanta Waste Incinerator (Florida) - Title V renewal
  - Lambert Compressor Station (Virginia) - Air permit denial
  - Align RNG Facility (North Carolina) - Air monitoring required

# Environmental Justice

## Virginia regulatory board denies Mountain Valley Pipeline compressor station permit

BY: SARAH VOGELSONG - DECEMBER 3, 2021 2:48 PM



Workers laying the Mountain Valley Pipeline in Roanoke County. (Ned Oliver/Virginia Mercury)



# Moving to a Carbon Free Future



# 2021 ESG report highlights

## GOALS AND COMMITMENTS

### ENVIRONMENTAL

- At least 50% carbon reduction and net-zero gas LDC methane emissions by 2030 (Scope 1)
- Expanded net-zero by 2050 goals to include Scope 2 and certain Scope 3 GHG emissions
- Goal to exit coal generation by 2035<sup>(1)</sup>

### SOCIAL RESPONSIBILITY

- Commitment to social responsibility including diversity and inclusion and stakeholder and community engagement

### GOVERNANCE

- Maintain strong corporate governance

## RECENT ACCOMPLISHMENTS

### Carbon Reduction

- ✓ Exceeded 44% carbon reduction from 2005 in 2021
- ✓ Decarbonizing natural gas business, focusing on methane detection and reduction of emissions using technology

### Fleet Transition

- ✓ 56 coal units retired since 2010, ~7,500MW
- ✓ 10,500MW of renewable energy on our system, on track to reach 24,000MW by 2030

### R&D

- ✓ Advocating for clean energy R&D investment and piloting/advising on new clean energy technology
- ✓ Member of National Electric Highway Coalition and working with schools and cities to help decarbonize their vehicles

### Social

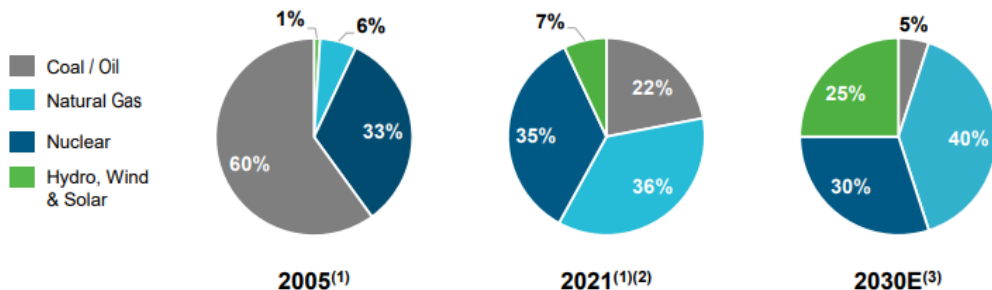
- ✓ Spent more than \$1.5 billion with diverse suppliers in 2021
- ✓ Strengthened and published our environmental justice principles based on stakeholder input
- ✓ Most diverse recruiting year with 35% female and 34% people of color new hires, released EEO-1 data

### Governance

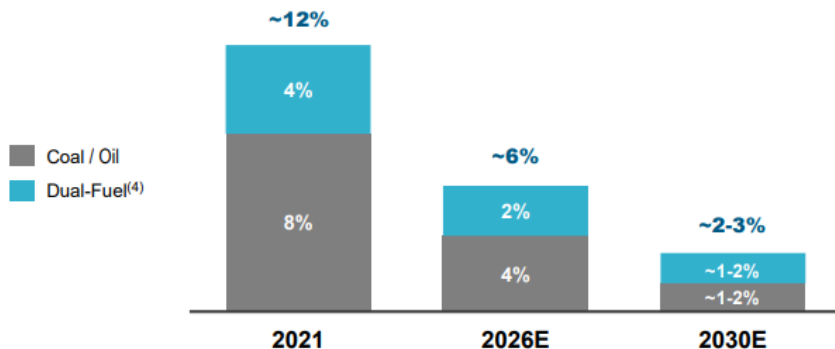
- ✓ Ranked #1 utility for investor transparency by Labrador in its 2021 report
- ✓ Continued board refreshment; 50% gender/racial diversity

# Transforming the way we produce power

## Generation (MWh) by Fuel Type



## Coal as a % of Earnings Base



(1) 2005 and 2021 data based on Duke's ownership share of U.S. generation assets as of Dec. 31, 2021.

(2) 2021 data excludes 9,088 GWh of purchased renewables, equivalent to ~4% of Duke's output.

(3) 2030 estimate will be influenced by customer demand for electricity, weather, fuel and purchased power prices, and other factors.

(4) As of December 31, 2021, the dual-fuel capable units and percentage of gas capacity are Cliffside 6 (100%), Belows Creek 1 & 2 (50%), Cliffside 5 (40%), Marshall 1&2 (40%), Marshall 3&4 (50%), Edwardsport (100%).

## North Carolina clean energy legislation

### ENGAGING WITH STAKEHOLDERS TO DEVELOP CLEAN ENERGY TRANSITION

- Filed proposed Carbon Plan on May 16, which includes four portfolios to meet 70% interim reduction targets and carbon neutrality by 2050
  - All portfolios replace coal with diverse mix of solar, storage, wind, small modular nuclear and natural gas
  - "All of the above" strategy that balances affordability and reliability
  - NCUC required to approve Carbon Plan by Dec. 31
  - Carbon Plan will be reviewed every two years and adjusted as needed
- Constructive rulemaking orders for performance-based regulation completed – consistent with the policy objectives of HB 951
- Expect to file a DEP-NC rate case in the fourth quarter of 2022, and likely a DEC-NC rate case in early 2023

2022 Timeline	Filed	Order	Docket #
Rulemaking for performance-based regulation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E-100 Sub 178
Rulemaking for coal plant securitization	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	E-100 Sub 177
Carbon Plan	<input checked="" type="checkbox"/>	By December 31	E-100 Sub 179



# Carbon Plan – A proposal for a cleaner energy future



## New resources by 2035

See additional details in the full Carbon Plan at [www.duke-energy.com/CarolinasCarbonPlan](http://www.duke-energy.com/CarolinasCarbonPlan)

The Carbon Plan proposes prudent near-term procurement and development work on the following resources, which are common to most portfolios and preserve longer term optionality:

- 3,100 MW of **new solar** (with 600 MW of paired **storage**)
- 1,000 MW stand-alone **battery storage**
- 600 MW in **onshore wind**
- 2,000 MW of **hydrogen-capable natural gas**
- Early development work for **offshore wind** (800 MW), **small modular nuclear** (570 MW) and **pumped storage** (1,700 MW) – long lead-time resources for deployment in the early 2030's
- Grid enhancements to support interconnection of new renewables and storage

### 2022 – Remaining steps

Public Hearings  
7/11 Durham  
7/12 Wilmington  
7/27 Asheville  
7/28 Charlotte  
8/23 Virtual

NCUC Ruling  
12/31

May 16 – December 31

NCUC Process

2023 – File for SC approval in next comprehensive IRP

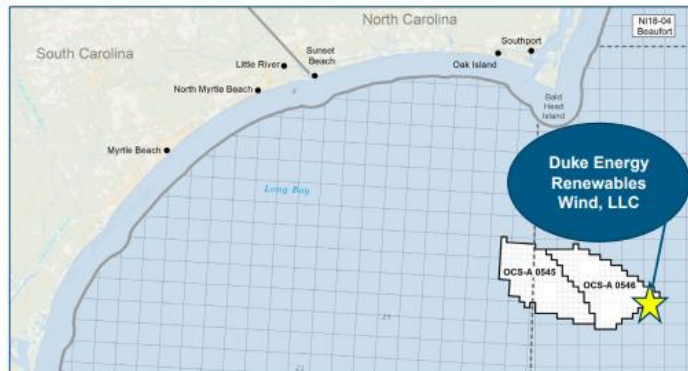
2024 - Check and adjust (every two years)

## Offshore wind – Carolina Long Bay

### MAINTAINING OPTIONALITY FOR OFFSHORE WIND IN THE CAROLINAS

- Creates optionality for up to 1.6 GWs of offshore wind generation if offshore wind is selected by the NCUC to be included in the Carbon Plan
- Carolina Long Bay lease secured by Duke Energy Renewables Wind, LLC
  - Total lease cost: \$155 million
  - Acres: 55,154 (\$2,810/acre)
  - 18 nautical miles from shore

Next Steps	Status
DOJ Antitrust Review; Lease Execution	June 2022
Site Assessment Plan	June 2023
Construction and Operations Plan	2026
Operation	2030



*Timing and subsequent steps are contingent on the Bureau of Ocean Energy Management's approval of Site Assessment Plan and Construction and Operations Plan.*

## Alternative technology partnerships and investments

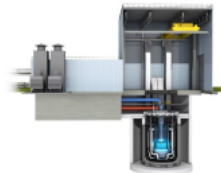
### HYDROGEN

- Partnering with Siemens and Clemson University on a Department of Energy supported study to evaluate hydrogen integration and utilization at the Duke owned and operated Clemson combined heat and power plant
- The pilot project began in March 2021 and includes studies on hydrogen production, storage and co-firing with natural gas
- Evaluating 30% co-firing of hydrogen in 2024 and 100% firing of hydrogen on or before 2030



### ADVANCED NUCLEAR

- Partnering with TerraPower and the Sodium Reactor team. Duke Energy's role is to provide consulting and advisory in-kind services
- The Sodium plant is designed with integrated thermal storage with a steady state electrical output of 345 MW that can increase to 500 MW utilizing stored energy
- The project is targeting to be operational within 7 years (by 2028)



### ENERGY STORAGE

- Testing Honeywell's new flow battery technology, which can store and discharge electricity for up to 12 hours, exceeding the duration of lithium-ion batteries, which can only discharge up to 4 hours
- Honeywell will deliver a 400-kilowatt-hour (kWh) unit to Duke Energy's Emerging Technology and Innovation Center in Mount Holly, N.C. in 2022
- Will begin testing EOS Znyth Gen 3.0 battery (zinc bromine) in late 2022



### DUKE ENERGY VENTURES

- Duke Energy has an established corporate venture capital effort including investments in VC funds managed by Energy Impact Partners and The Westly Group
- Duke Energy leverages VC investing to stay current on new and innovative technology and foster interactions between Duke Energy subject matter experts and start-up companies





Just One More  
Thing.....

## What Happens to Duke Energy's Coal Fired Power Plants After Retirement?

And just one  
more thing.....

**Can you have a Reinhold  
Environmental Key Note Talk  
without talking bourbon?**



On that note...Thanks for listening,  
and have a good day !





*BUILDING A **SMARTER** ENERGY FUTURE®*