

Duke Energy – LDES Perspectives

Generation & Transmission Strategy – Generation Technologies | Jared Troyer, PE



About Duke Energy

Headquartered in
Charlotte, NC

DUK
LISTED
NYSE

A FORTUNE 150 COMPANY

\$79B

MARKET CAP
(AS OF MAY 2024)

\$180B

TOTAL ASSETS

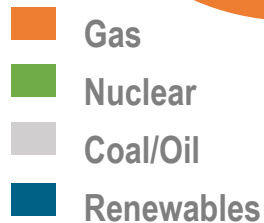
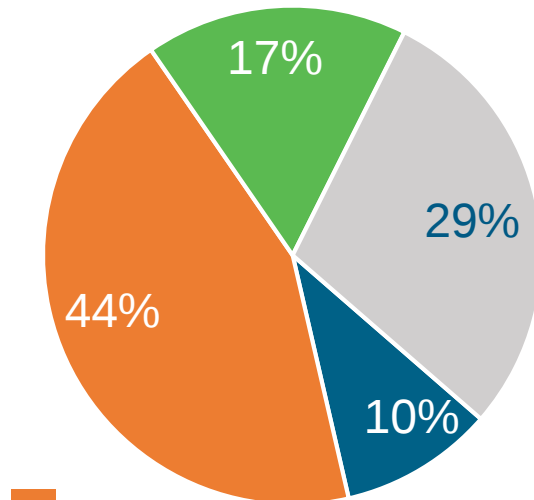
28K

EMPLOYEES

55GW

TOTAL GENERATING
CAPACITY

55 GW Generating Capacity



Electric Utilities & Infrastructure

8.4 million
customers
in six states



Gas Utilities & Infrastructure

1.7 million
customers
in five states



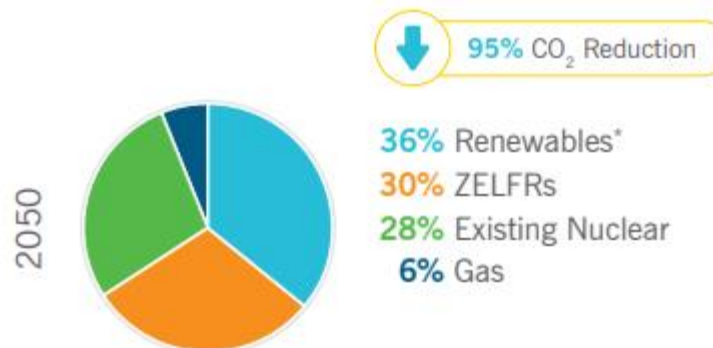
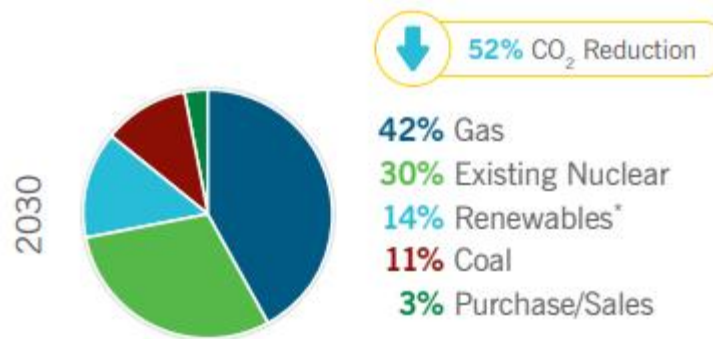
About Duke Energy

- Net-Zero CO₂ Goals
 - 50% reduction by 2030 (70% in NC required by state law)
 - Net-Zero by 2050

Duke is hunting for a *Zero-Emitting-Load-Following-Resource* (**ZELFR**)

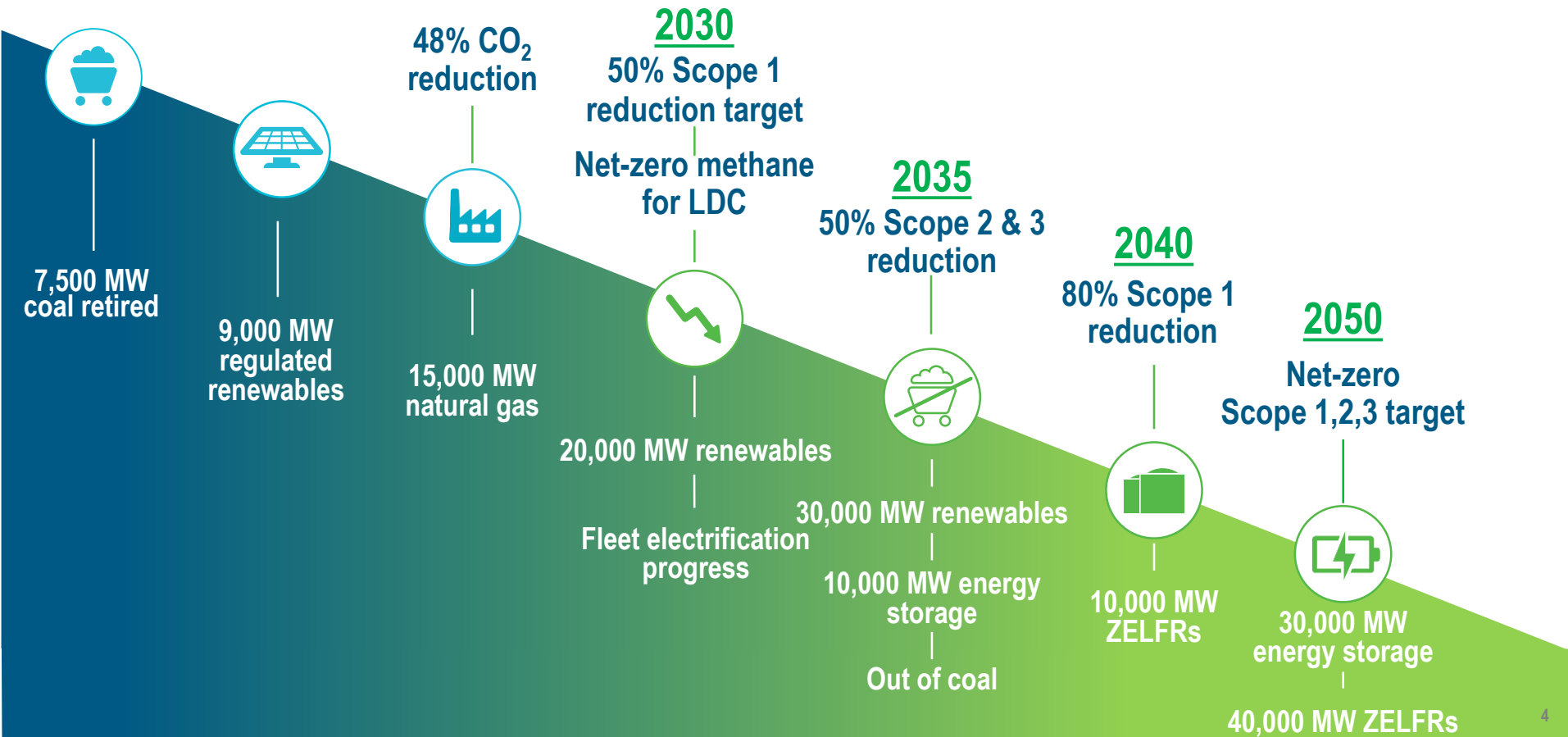
- Advanced Nuclear
- Carbon Capture with Utilization and Storage
- Hydrogen and other low carbon fuels
- **Long Duration Energy Storage**

Duke Energy Regulated Generation, MWh



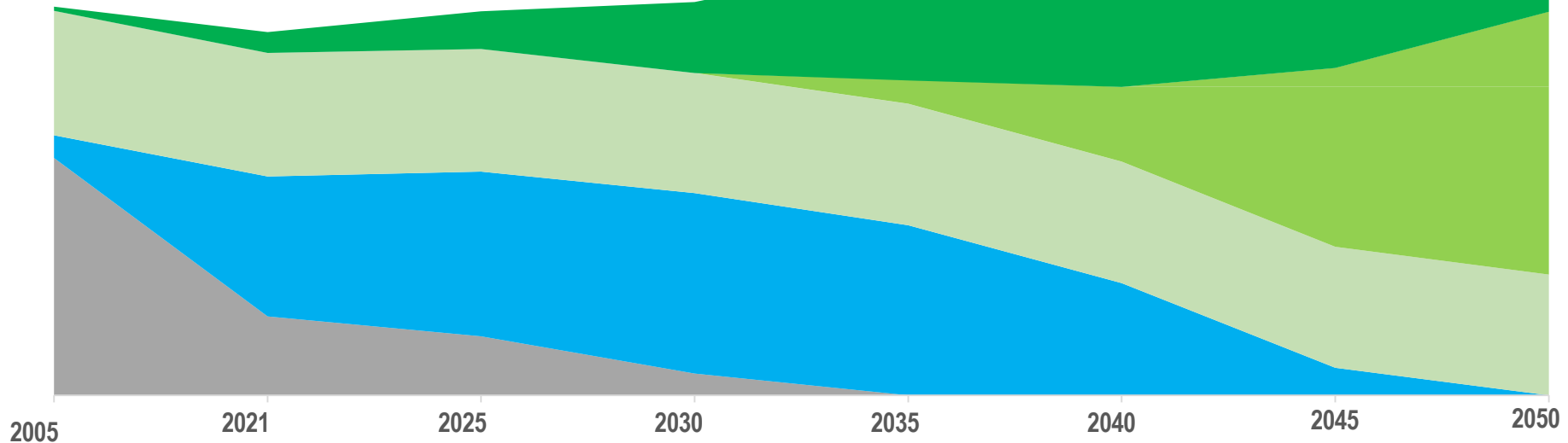
*Renewables include hydro, wind, solar, landfill gas, biomass, etc.

Road to Net-Zero



ZELFRs Expected to be 1/3rd of Generation by 2050.

- Coal:** Represented ~60% of generation in 2005; declining to ~5% by 2030
- Natural Gas:** Bridge fuel, enabling coal retirements over the next decade
- Existing nuclear:** Reliable zero-carbon baseload generation throughout
- Renewables:** Builds to ~35% of total generation by 2040
- ZELFRs⁽¹⁾:** Dispatchable zero-carbon resources; enables transition from natural gas

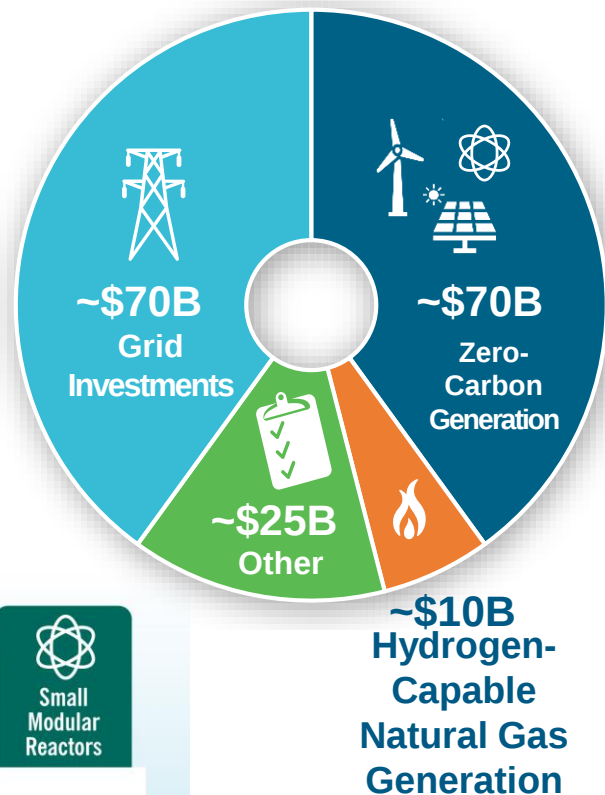
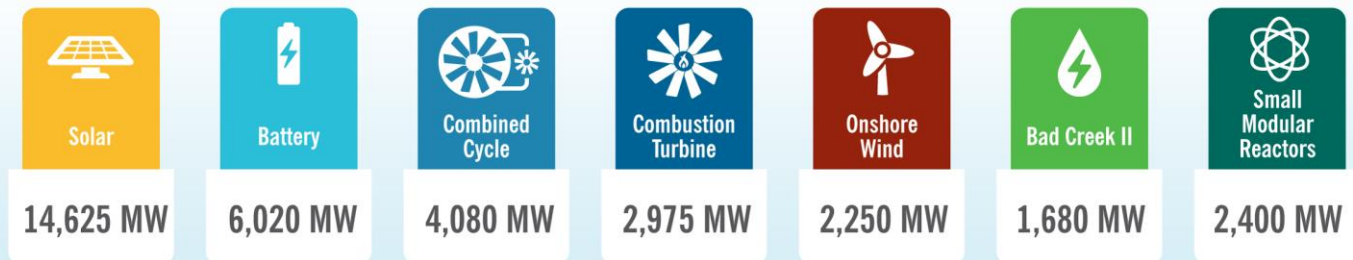


Carolina's Resource Plan – All the above approach

Adding almost 30 GW in next 15 years

Current system: 33 GW

Resource additions over next 15 years (2038)



Duke Energy LDES Pilot Activity

- Studies
 - DOE / Malta – Integration Thermal Storage/Pumped Heat into a retiring coal plant
 - EPRI Cost and Performance Study – 500MW / 10-hr A-CAES Hydrostor System
- Small Scale Pilots
 - EOS – Aqueous Zinc Battery – 300kW / 4hrs
 - EnerVenue – Nickel-Hydrogen Battery – 250kW / 1.5hrs
 - GKN Hydrogen Fuel Cell – 10kW / 40hrs
- Suwannee Pilot
 - 5MW / 40MWh (8hrs)
 - Technologies Evaluated – Flow, Zinc Aqueous, Sodium Sulfur
 - **Sodium Sulfur (NaS)** Battery by BASF/NGK selected
- Evaluating options for larger pilots/demonstrations



EnerVenue at McAlpine Creek Substation

Duke's Roadmap of LDES Technologies

- Include more LDES in future IRPs
 - Technology Readiness Level (TRL) Considerations
 - 3rd Party Cost & Performance Data
 - Round-Trip-Efficiency (RTE) versus CapEx
- Goals:
 - Add 10-hr Proxy & 100-hr Proxy LDES options into IRPs
- Needs:
 - Supplemental funding opportunities
 - Smart Policy / Recovery Mechanisms
 - Value Stacking – Increasing Unit Flexibility