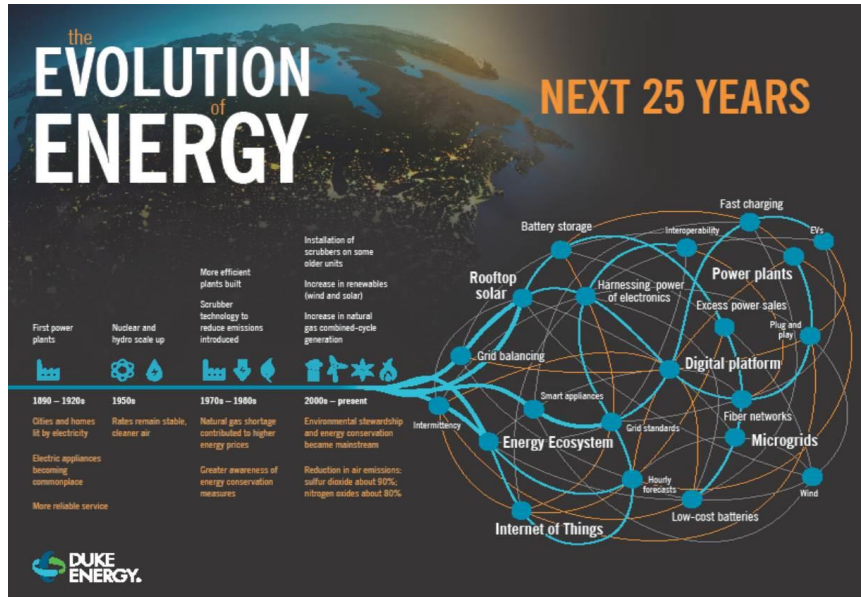


A Cleaner and Smarter Energy Future

Robert Sipes, Vice President, Western Carolinas Modernization



What's Next?



- Cleaner Generation
 - Combined Cycle
 - Solar
 - Storage
- Community Engagement / Energy Efficiency
- Modernizing the Grid

New Generation - Feb. 2018 vs. Feb 2019



Western Carolinas Modernization Project – DEP

- DEP identified approximately 10 potential battery projects (total >5 MW) throughout the region, with potential construction beginning in 2018. We've identified approx. 19 megawatts to date.
- Configure each battery to serve multiple functions, such as frequency regulation and/or back-up power for local customers.
- Aggregated storage deployment supports the deferral of the 186- megawatt CT unit by freeing up existing generation capacity to then serve the winter peak.
- Engaged the EITF Technology Working Group



Hot Springs – DEP



Asheville Rock Hill – DEP





Our Goal

Enlist **public support** and provide **easy access** to resources that allow everyone to be a part of creating a clean energy future for Asheville and Buncombe County.

www.bluehorizonsproject.com

Duke Energy's Climate Report

- **Continue fleet modernization** – By 2030, the company expects more than 80 percent of its generation mix to come from zero and lower CO₂-emitting sources.
 - 40 percent reduction in CO₂ by 2040, from 2005 levels.
- **Continue investments in nuclear fleet** – Through 2017, this zero CO₂ emissions option marked 19 consecutive years operating at a capacity factor exceeding 90 percent, and the company is evaluating the possibility of extending nuclear operating licenses.
- **Expand renewables and natural gas** – Invest \$11 billion over 2017 to 2026 in new natural gas-fired, wind and solar generation.
- **Modernize the electric grid** – Invest \$25 billion between 2017 and 2026 to create a smarter, more resilient grid with smart grid technologies to enable more renewables, and storm hardening and targeted undergrounding of electric lines to protect against extreme weather.

Duke Energy's Climate Report

- **Promote energy efficiency** – Based on the expansion of existing programs, the company expects cumulative energy savings to grow to 22,000 GWh by 2030, which is the equivalent to the annual usage of 1.8 million homes.
- The report also includes a “**2-degree scenario**” analysis of the potential long-term impacts on the company’s generation fleet associated with the possibility of reducing CO₂ emissions consistent with limiting global warming to no more than 2 degrees Celsius over pre-industrial levels.
 - The analysis is based on a number of assumptions and reflects just one possible pathway the company could take to achieve carbon reductions. The company’s current carbon goal to reduce CO₂ emissions 40 percent by 2030 is consistent with a pathway to achieve a science-based 2-degree target.
- To read Duke Energy’s 2017 Climate Report to Shareholders, visit [duke-energy.com/our-company/sustainability](https://www.duke-energy.com/our-company/sustainability).

Trends in the Industry

In the context of the emerging distributed electric system, Duke Energy has recognized multiple trends and facts that warrant recognition and analysis.

I Threats to grid infrastructure

II Technology advancements – Renewables and DER

III Lower carbon future and other environmental trends

IV Impact of weather events

V Grid improvement

VI Concentrated population growth

VII Customer expectations

Implications To Our Customers From The Megatrends

Our customers are impacted by the megatrends, and, under business as usual (BAU), our customers' expectations will not be met and we will miss the opportunity to optimally use advanced technology.

I Increased costs

II Reduced reliability and resiliency

III Reduced ability to manage and integrate distributed energy resources (DER)

IV Reduced ability to meet customer expectations and commitments

V Reduced economic competitiveness for North Carolina

VI Increased geographic and demographic disparity

Duke Energy's NC Grid Improvement Plan Framework

OPTIMIZE

Optimize the total customer experience

Energy Storage	EV Charging	Hardening and Resiliency [T]	Hardening and Resiliency [D]	Integrated Volt-Var Control	Long Duration Interruptions
Oil Breaker Replacement	Self-Optimizing Grid	Targeted Undergrounding	Transformer Retrofit	Transformer Bank Replacement	

MODERNIZE

Leverage enterprise systems and technology advancements

Advanced Metering	DER Dispatch Tool	Distribution Automation	Enterprise Applications	Enterprise Communications
Customer Data Access	Integrated System Operations Planning	Power Electronics	Transmission System Intelligence	

PROTECT

Reduce threats to the grid

Physical & Cyber Security

MAINTAIN¹

⁽¹⁾ Maintain base work not included in NC Grid Improvement Plan

Serve customers in a manner that meets industry safety, reliability and environmental standards

Line Extensions	Capacity Expansions	Substation Additions	Outage Follow-up	Pole Replacements
Vegetation Management	End-of-life Asset Replacement	Equipment Inspection & Maintenance	General System Protection	

