

October 13, 2023

VIA ELECTRONIC FILING

Ms. A. Shonta Dunston
Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4300

**RE: Duke Energy Carolinas, LLC and Duke Energy Progress,
LLC's October 12, 2023 Technical Conference Presentation
Docket No. E-100, Sub 190**

Dear Ms. Dunston:

Enclosed for filing on behalf of Duke Energy Carolinas, LLC and Duke Energy Progress, LLC (collectively, the "Companies") is the Companies' presentation during the October 12, 2023 scheduled technical conference in the above-referenced docket.

Thank you for your assistance in this matter. Please do not hesitate to contact me should you have any questions.

Very truly yours,

/s/ E. Brett Breitschwerdt



NCUC Technical Conference 2023 CPIRP Combined Carbon Plan and Integrated Resource Plan

Duke Energy Carolinas, LLC
Duke Energy Progress, LLC

October 12, 2023



Introductions



Introduction, Opening Remarks

Kendal Bowman

- *President, North Carolina*

Presenters

Nate Gagnon

- *Director, IRP Regulatory and Policy Strategy*

Mike Quinto

- *Director, IRP Advanced Analytics*

Tim Duff

- *General Manager, Customer Solutions
Regulatory Enablement*

Nelson Peeler

- *Senior Vice President, Transmission and
Fuels Strategy and Policy*

Available for Q&A

Sammy Roberts

- *General Manager, Transmission Planning and
Operations Strategy*

Phil Stillman

- *Managing Director, Load Forecast and CSRI*

Ben Smith

- *Generation and Regulatory Strategy Director*

Agenda



- **Changing Energy Landscape Impacting 2023 CPIRP**
- **Modeling Supports Prudent, Least-Cost Planning to Achieve Carbon Emissions Reductions**
- **Near-Term Actions Represent Reasonable Steps to Execute Plan and Achieve Carbon Emissions Reductions**
- **Key Enabler Updates**
 - “Shrinking the Challenge” through Energy Efficiency and Demand-Side Tools
 - Transmission
 - DEC and DEP Utility Merger

CPIRP Overview



Executive Summary

CHAPTERS

- 1 Planning for a Changing Energy Landscape
- 2 Methodology and Key Assumptions
- 3 Portfolios
- 4 Execution Plan

Chapter NC

2023-2024 CPIRP Update

Chapter SC

The Most Reasonable and Prudent Resource Plan for South Carolina's Future

APPENDICES

- A Stakeholder Engagement
- B DEC and DEP System Information
- C Quantitative Analysis
- D Electric Load Forecast
- E Screening of Generation Alternatives
- F Coal Retirement Study
- G Integrated System and Operations Planning
- H Grid Edge and Customer Programs
- I Renewables and Energy Storage
- J Nuclear
- K Natural Gas, Low Carbon Fuels and Hydrogen
- L Transmission System Planning and Grid Transformation
- M Reliability and Operational Resilience
- N Cross Reference

ATTACHMENTS

Attachment I - 2023 Resource Adequacy Study for Duke Energy Carolinas & Duke Energy Progress

Attachment II - 2022 Duke Energy Carolinas and Duke Energy Progress Effective Load Carrying Capability Study

Attachment III - 2023 Wind Effective Load Carrying Capability Study for Duke Energy Carolinas & Duke Energy Progress



Changing Energy Landscape

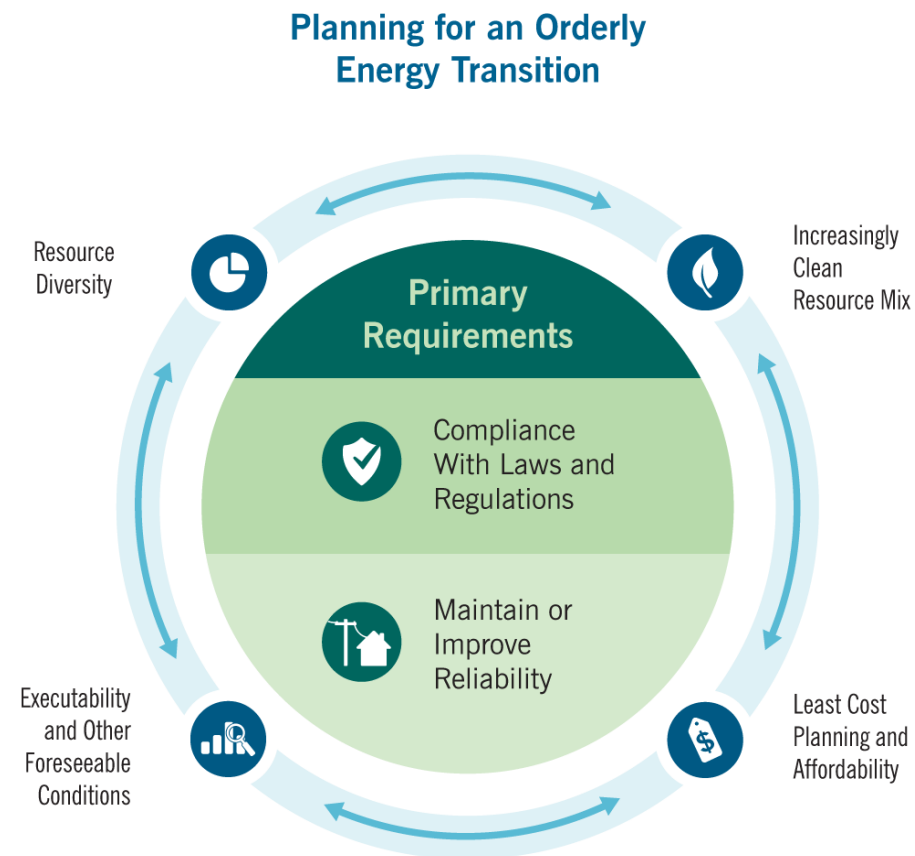


Planning in Context of a Changing Energy Landscape

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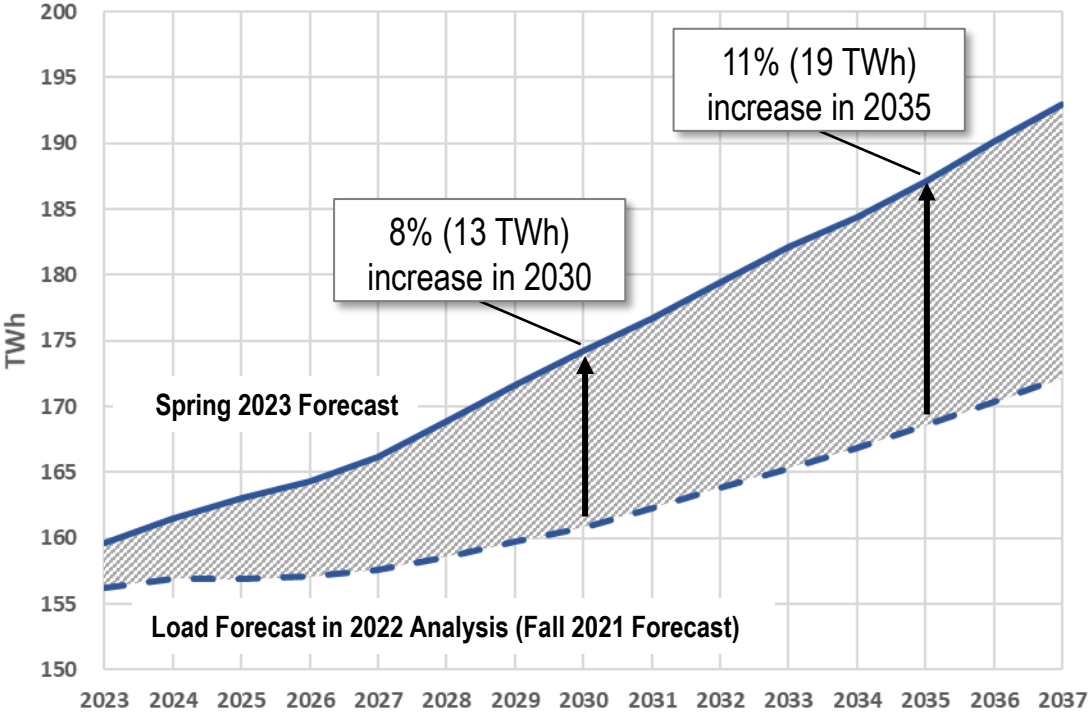
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	Growth	Economic Development, Population Growth, Electric Transportation
	Maintaining or Improving Reliability	Increased Planning Reserve Margin
	Policy and Regulatory Landscape	Impact on Planning Objectives and Assumptions
	Exit from Coal	Commodity Price, Transport, and Fuel Security Risks
	Financial and Timing Impacts	Incentives, Inflation, and Longer Lead Times
	Technology Advancements	Viability and Timing of Solutions on Planning Assumptions
	Consumer Trends	Potential Impact on Planning Assumptions

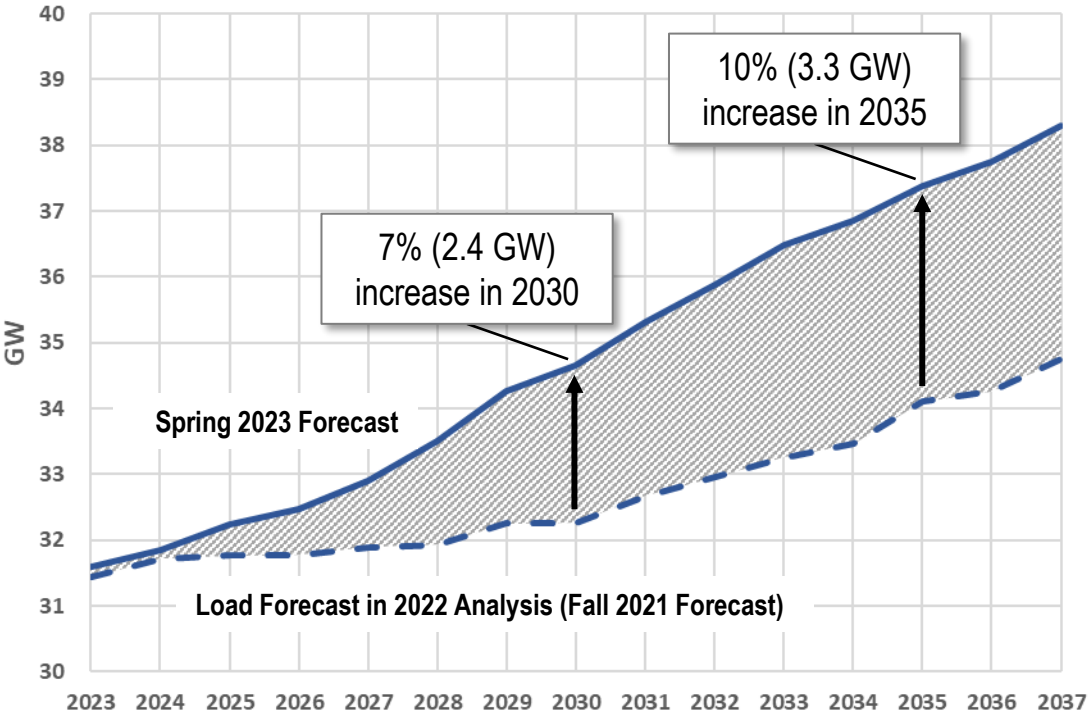


Planning to Support Continued Economic Growth

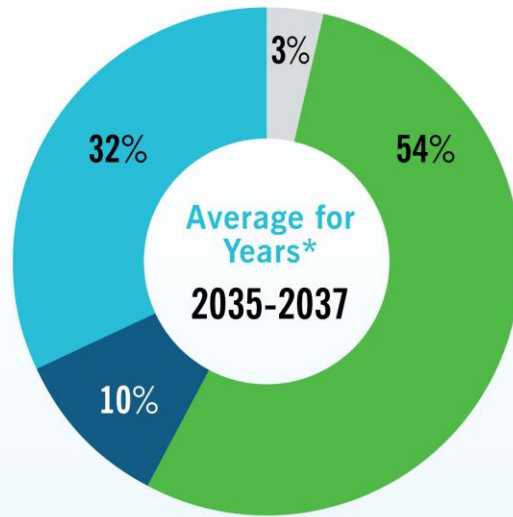
Forecasted Annual Energy Consumption



Forecasted Non-Coincident Winter Peak



A Growing Region - A Growing Demand for Electricity



**Drivers of Energy Increase
in Carolinas Load Forecast**



*Percentages do not add to 100% due to rounding

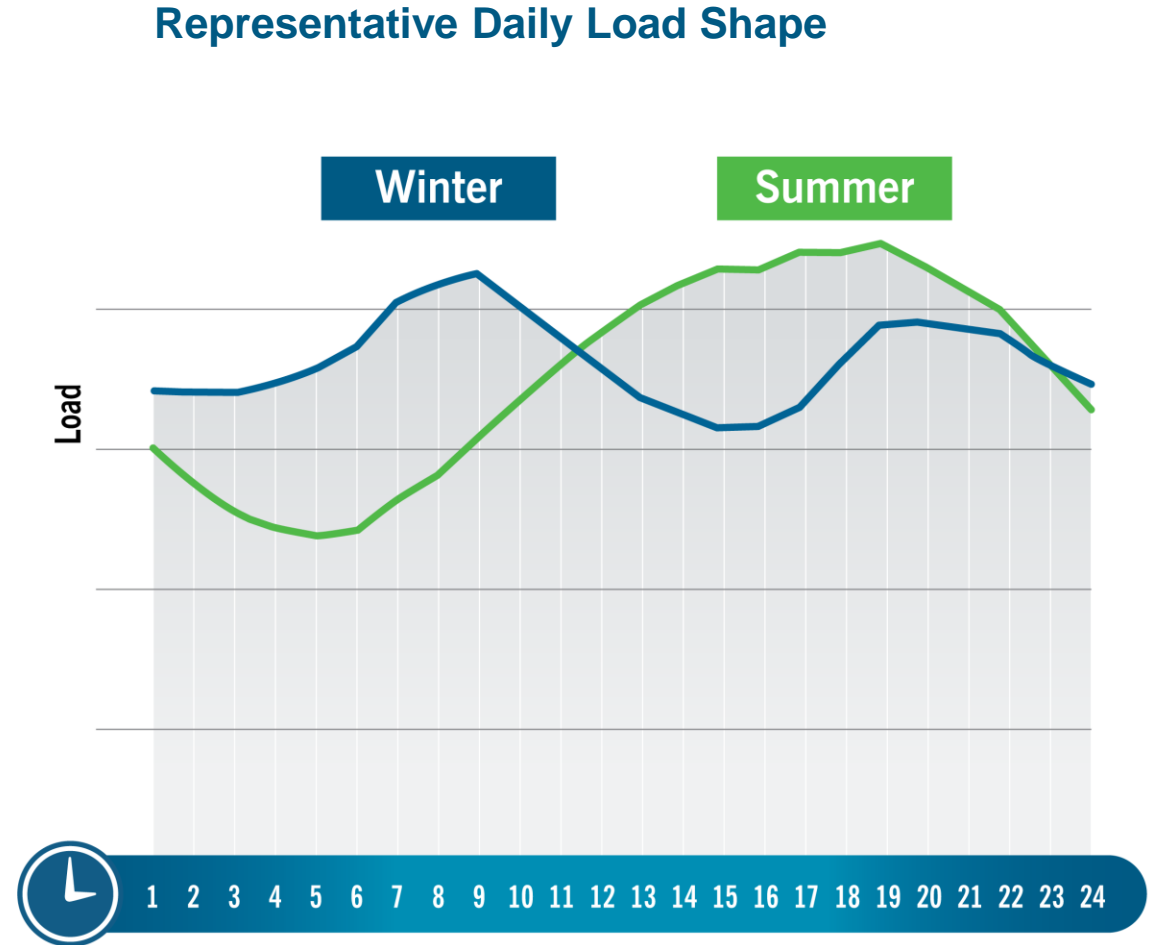
Drivers for demand growth

- Economic development successes
- Population growth
- Electric vehicle charging needs

Duke Energy's load growth is projected to surge by around 35,000 gigawatt-hours in the next 15 years – more than the total amount of electric retail sales in the states Delaware, Maine and New Hampshire combined.

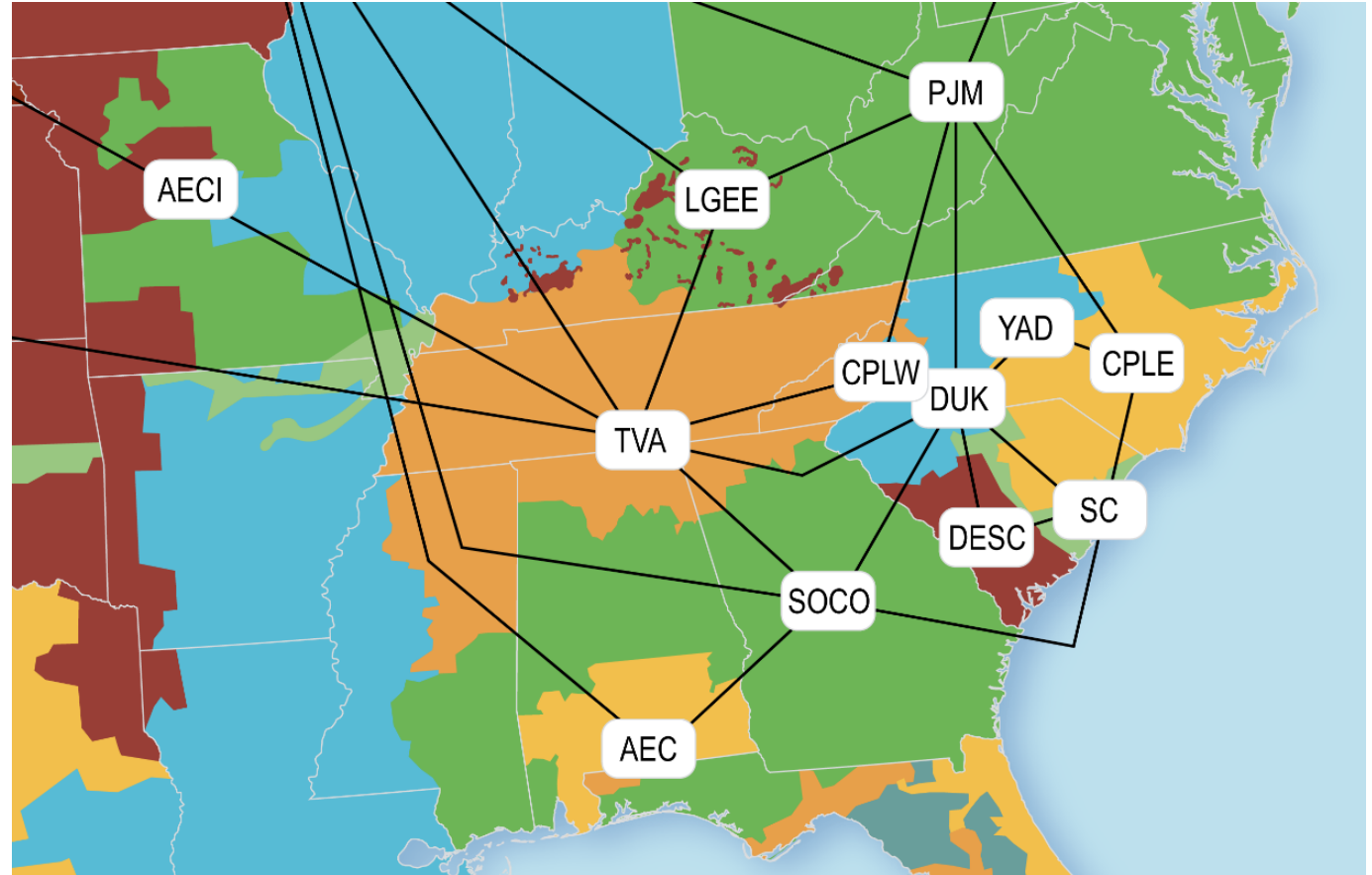
Seasonal Peaks and Planning Reserves

- The Companies' resource plans are developed to meet seasonal peak demands inclusive of a reserve margin to ensure reliable service to customers
- 2023 CPIRP reflects a 22% winter reserve margin
 - Accounting for extreme weather loads
 - Reduced reliance on neighbors
 - Long-term load forecast error
 - Updated unit performance and availability
- A diverse set of resources is needed to meet loads throughout the year, and the Companies' resource plan incorporates the different operational characteristics of its current and future fleet



Regional Neighbors Also Pursuing Energy Transition

- Updated surrounding region resource mix for the 2023 Resource Adequacy Study
 - Coal Retirements
 - Increases in Solar, Wind, and Storage
 - Significant Cold Weather Load Response
- Resource adequacy risk in surrounding regions shifting to winter, providing less market assistance on extreme cold days



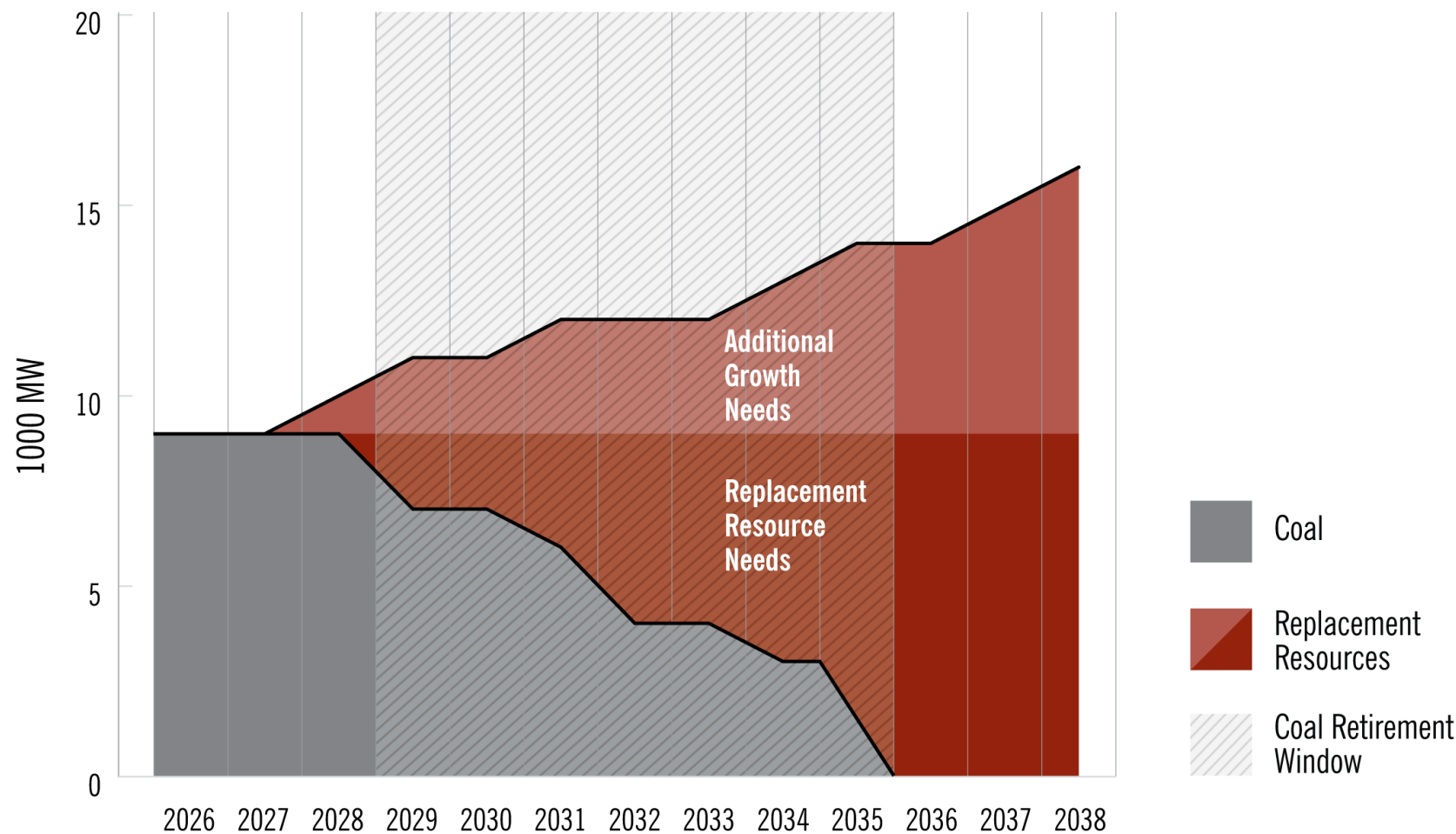


Modeling Supports Prudent, Least-Cost Planning to Achieve Carbon Emissions Reductions

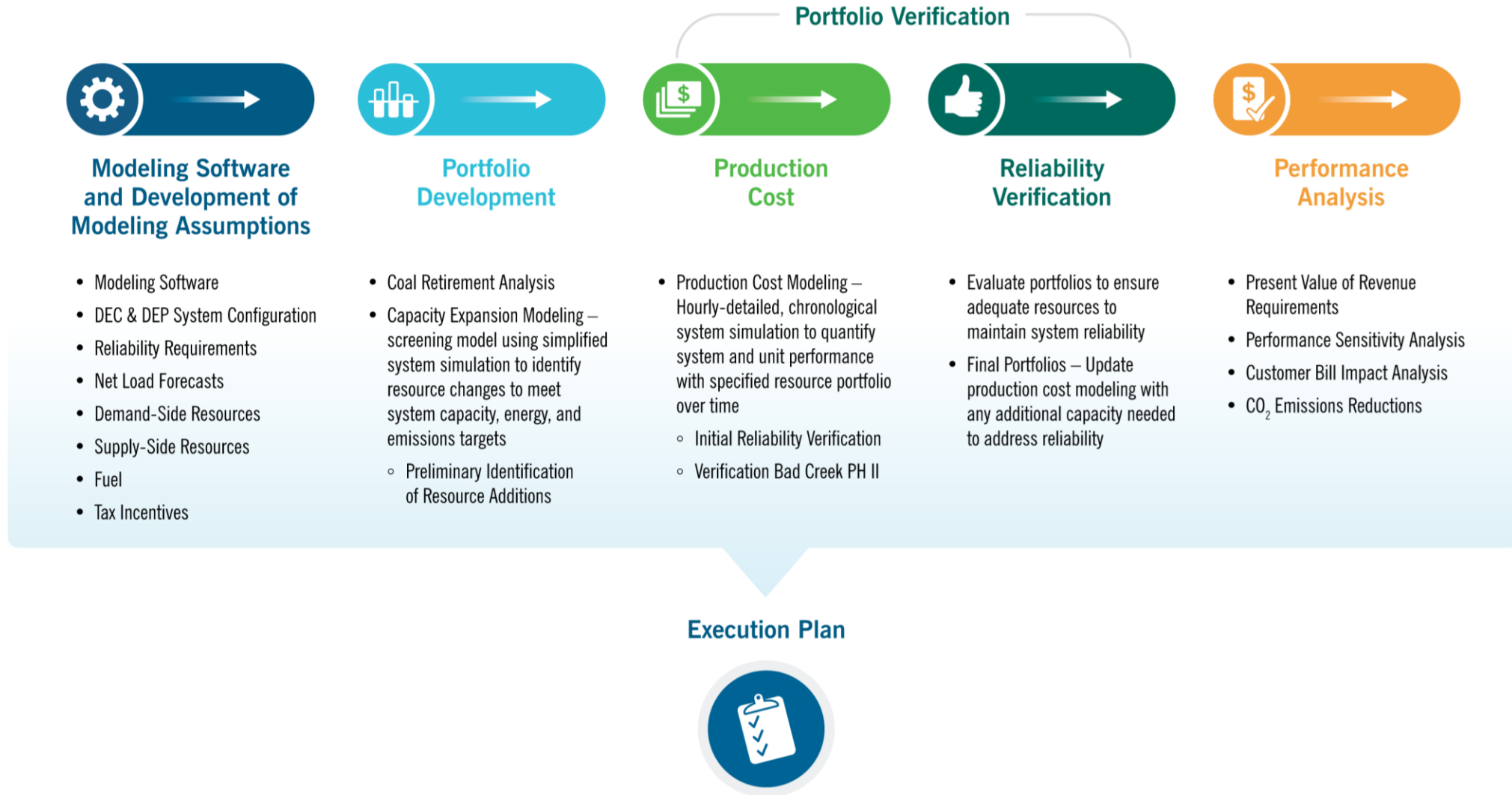


Load Growth and Retiring Coal Create Significant Resource Need

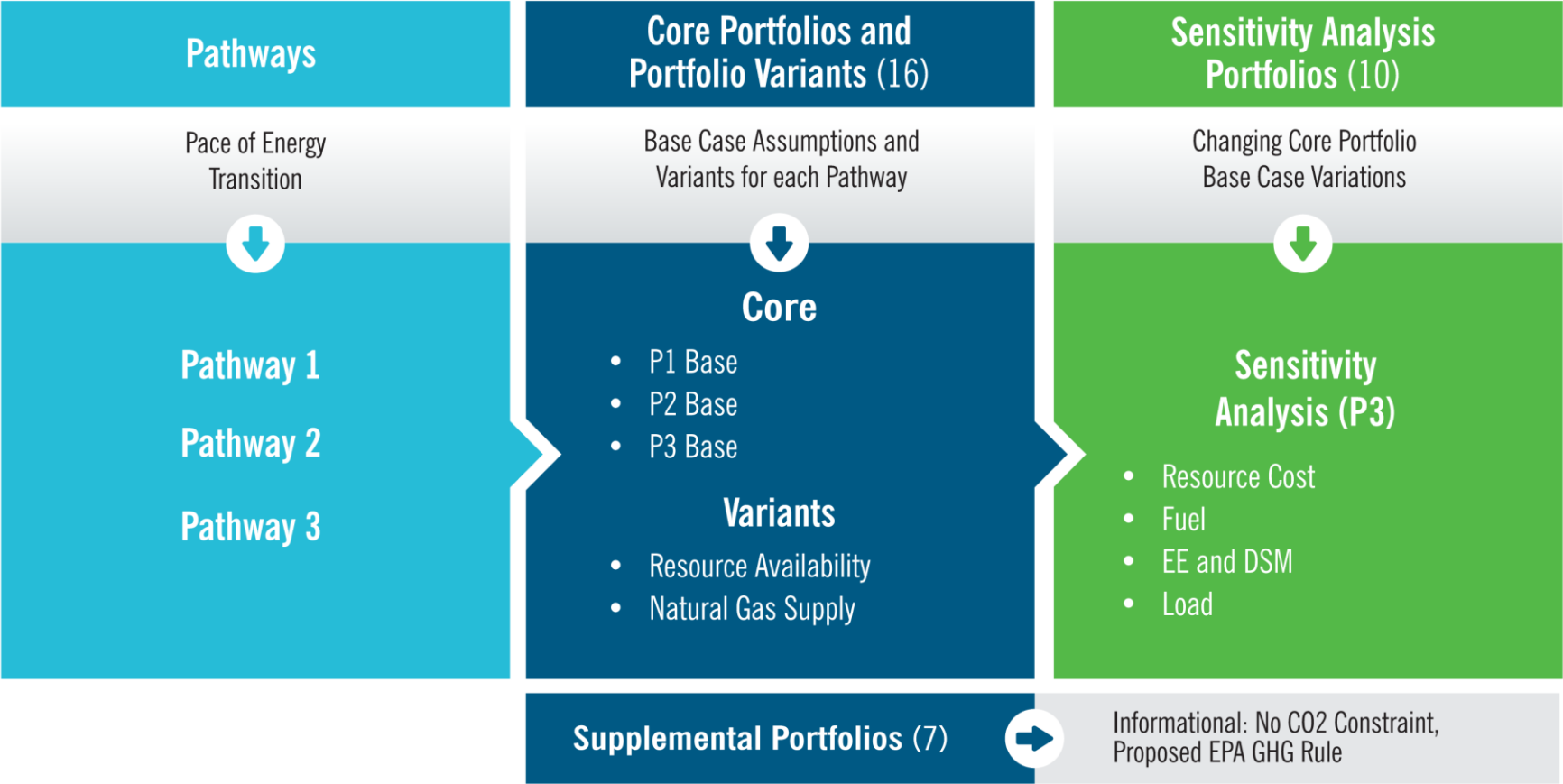
Net of EE and Grid Edge Activity



Analytical Process Flow Chart



Energy Transition Pathways and Portfolios



Coal Retirement Assumptions (Beginning of Year Basis)

	Capacity (MW)	2022	Pathway 1	Pathway 2	Pathway 3
DEC	Allen 1 & 5¹	426	2024	2025	2025
	Cliffside 5	546	2026	2029	2031
	Cliffside 6²	849	2049	2049	2049
	Marshall 1 & 2	760	2029	2029	2029
	Marshall 3 & 4	1,318	2033	2032	2032
	Belews Creek 1 & 2	2,220	2036	2036	2036
DEP	Mayo	713	2029	2031	2031
	Roxboro 1 & 2	1,053	2029	2029	2029
	Roxboro 3 & 4	1,409	2028-2034	2030	2033

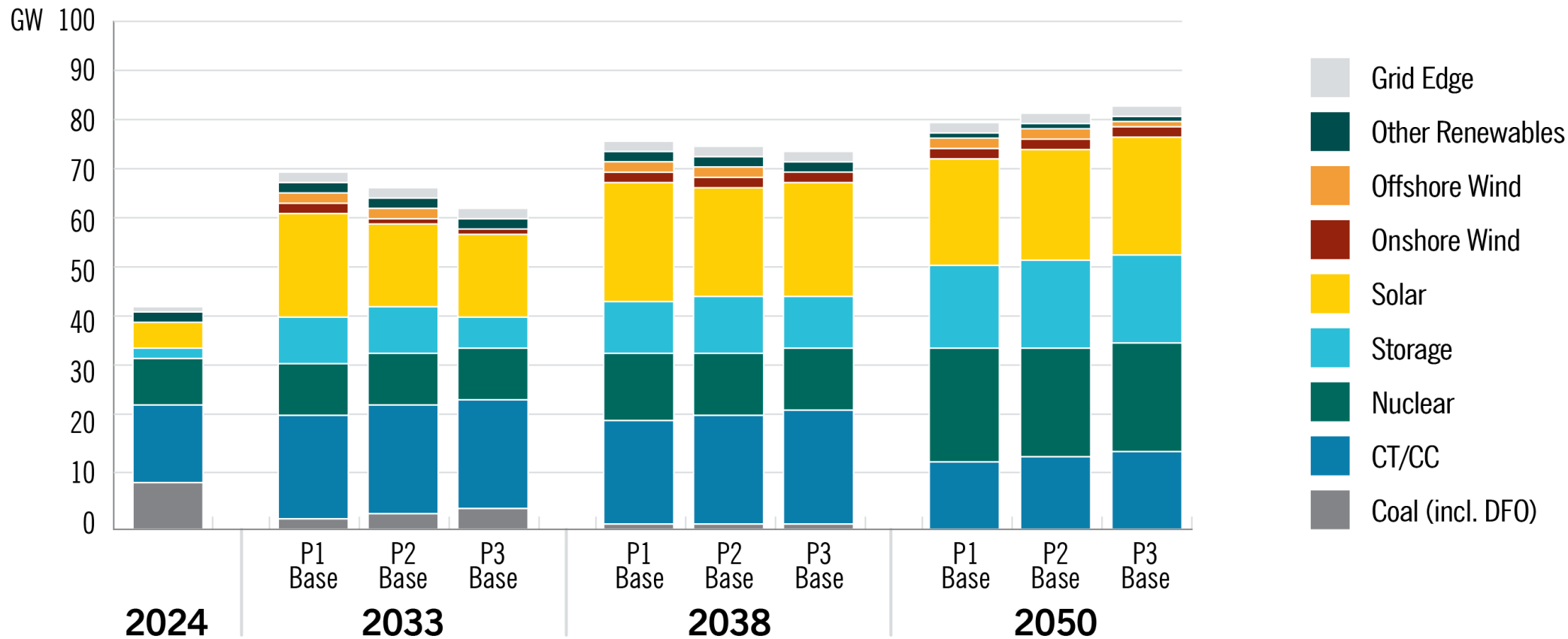
¹ Allen 1&5 retiring Dec 31, 2024

² Cliffside 6 is assumed to cease coal operations by the beginning of 2036. Retirement was not included in the Retirement Analysis based on natural gas cofiring capability.

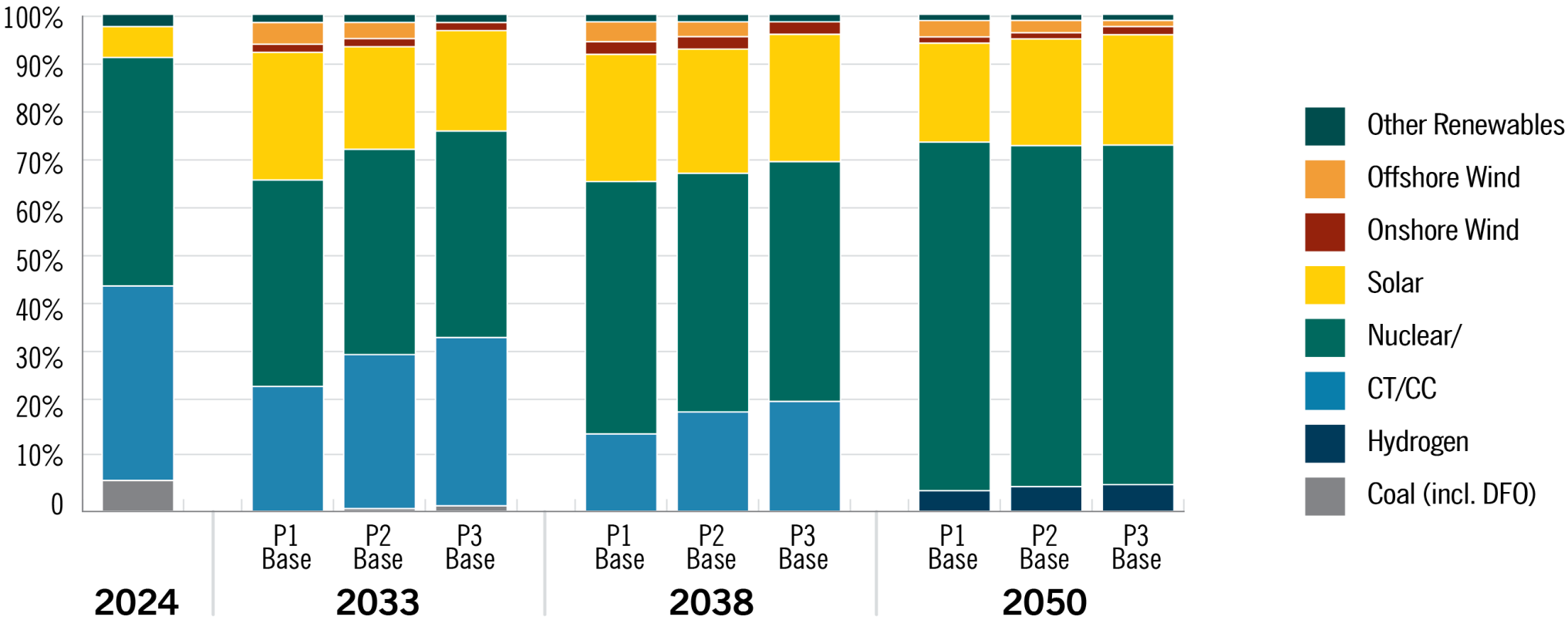
Incremental Resource Additions | Core Portfolios by 2030, 2033, 2035






Capacity Mix Over Time



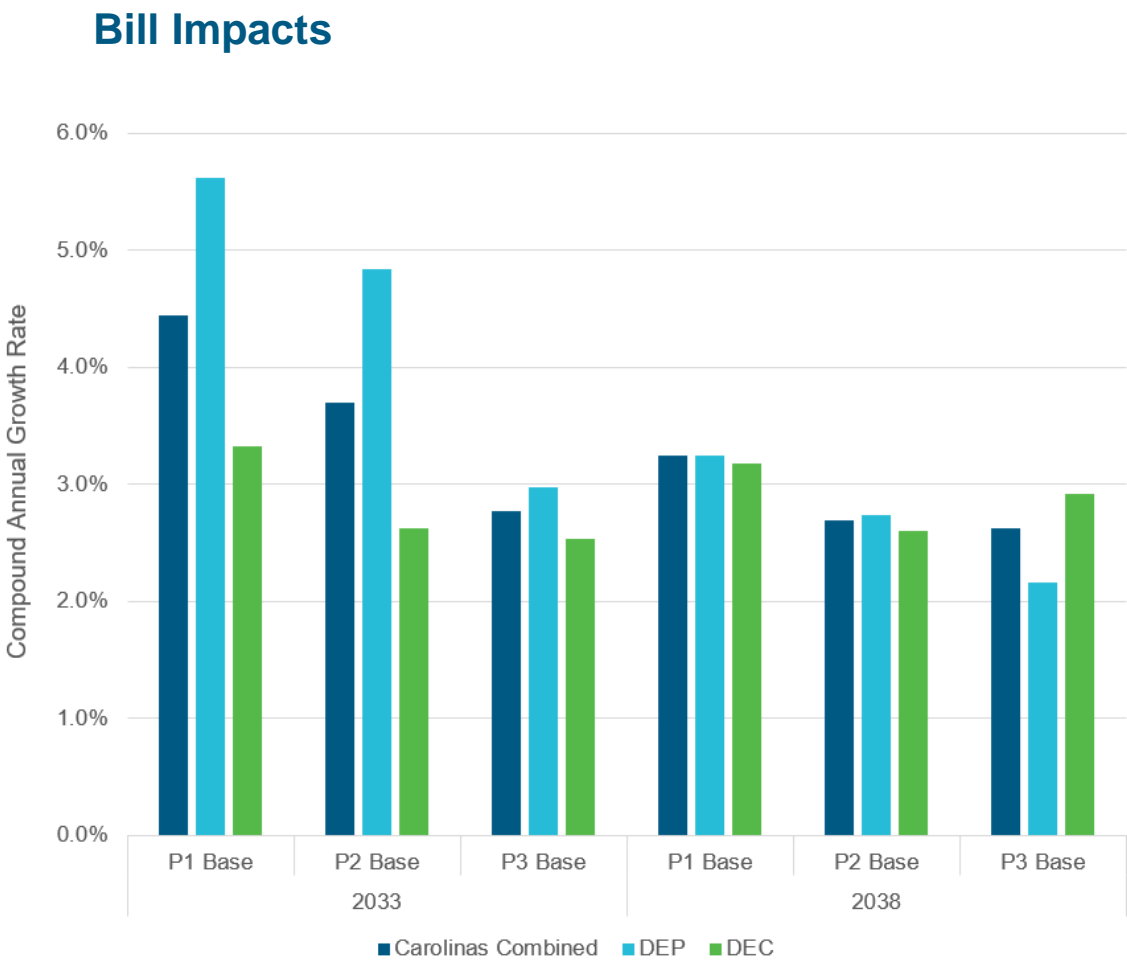
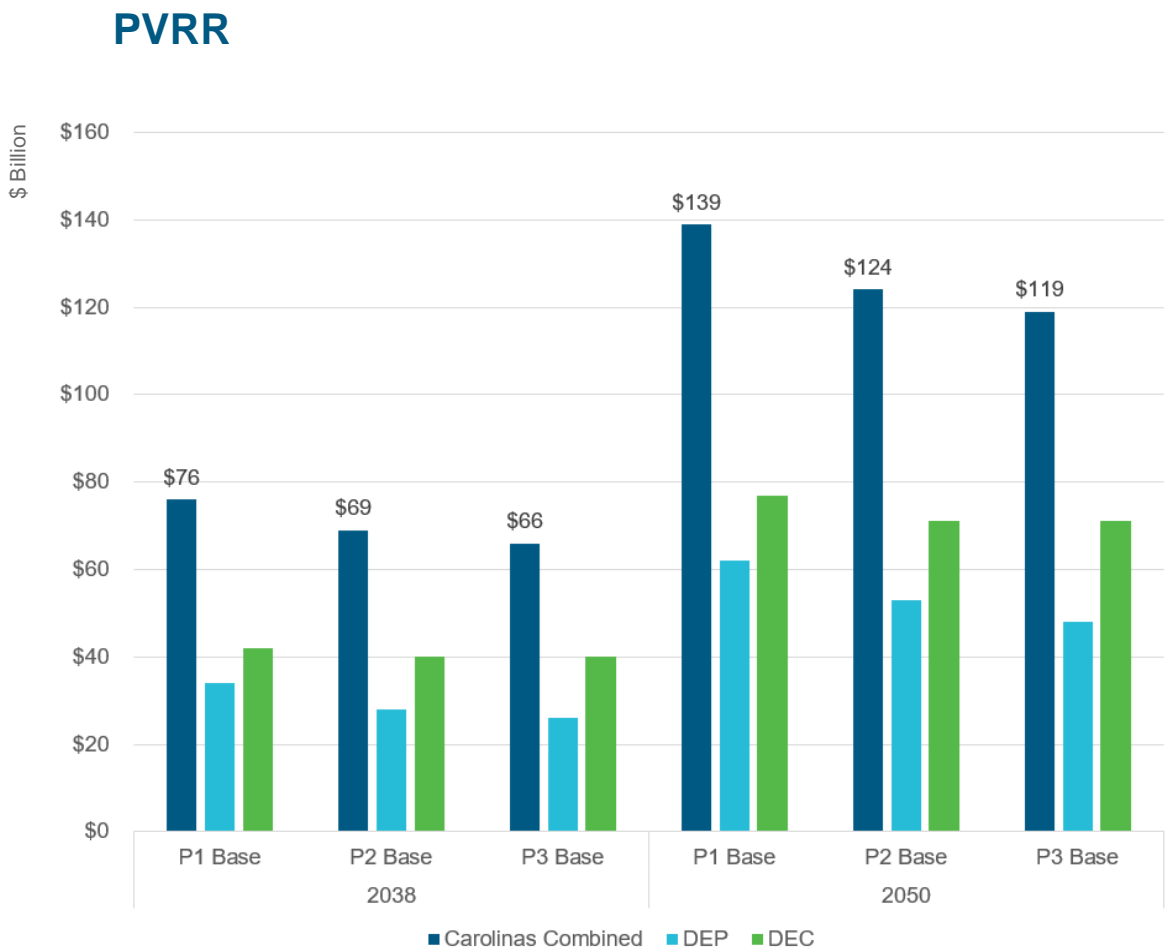
Energy Mix Over Time



Energy Transition Risk by Portfolio

CAROLINAS RESOURCE PLAN PORTFOLIOS			P1 Base		P2 Base		P3 Base	
ENERGY TRANSITION RISK ASSESSMENT (2033 2038)								
Cumulative Nameplate MW Additions of Resources with Limited Operational History in the Carolinas			10,274	15,704	9,114	14,994	4,894	12,604
Cumulative Nameplate MW Additions, Combined Carolinas System			31,907	39,737	27,107	38,312	22,887	37,297
Cumulative Nameplate MW Additions as % of Current Combined Carolinas System			73%	91%	62%	88%	53%	86%
Cumulative Capital Dollar Requirement, Combined Carolinas System [\$B]			\$85	\$130	\$59	\$101	\$44	\$92
Overall Pathway Risk Related to Cost, Reliability, and Plan Execution								

Cost by Portfolio

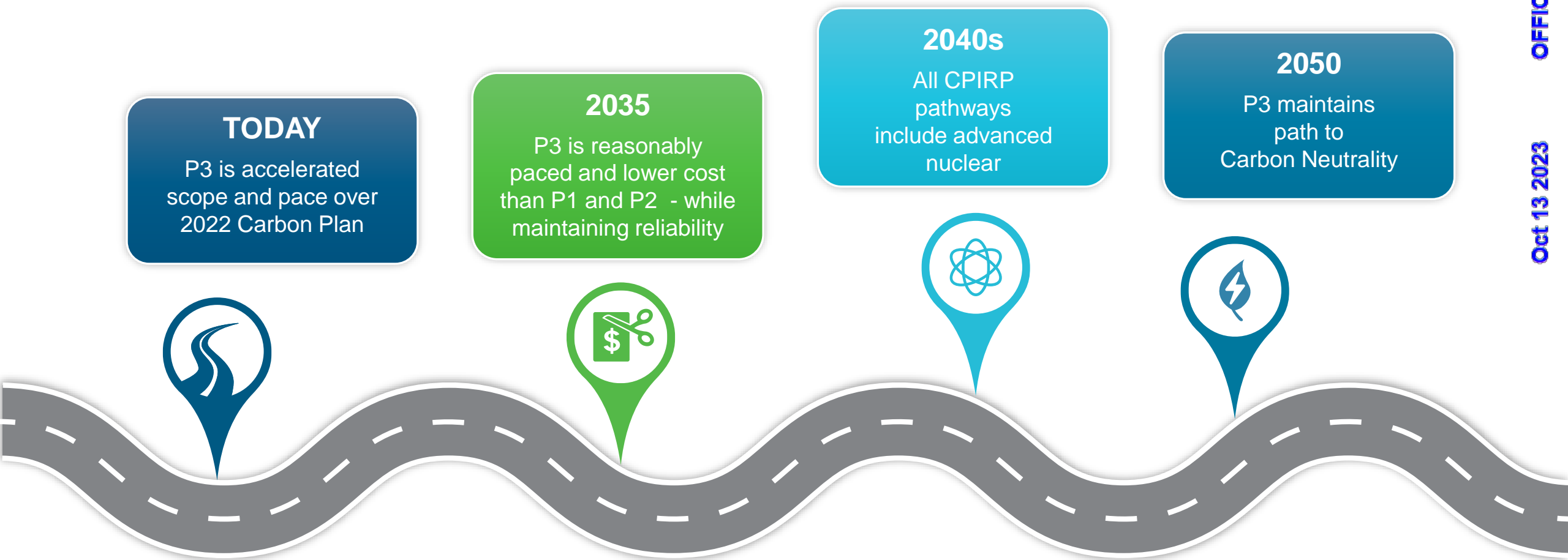




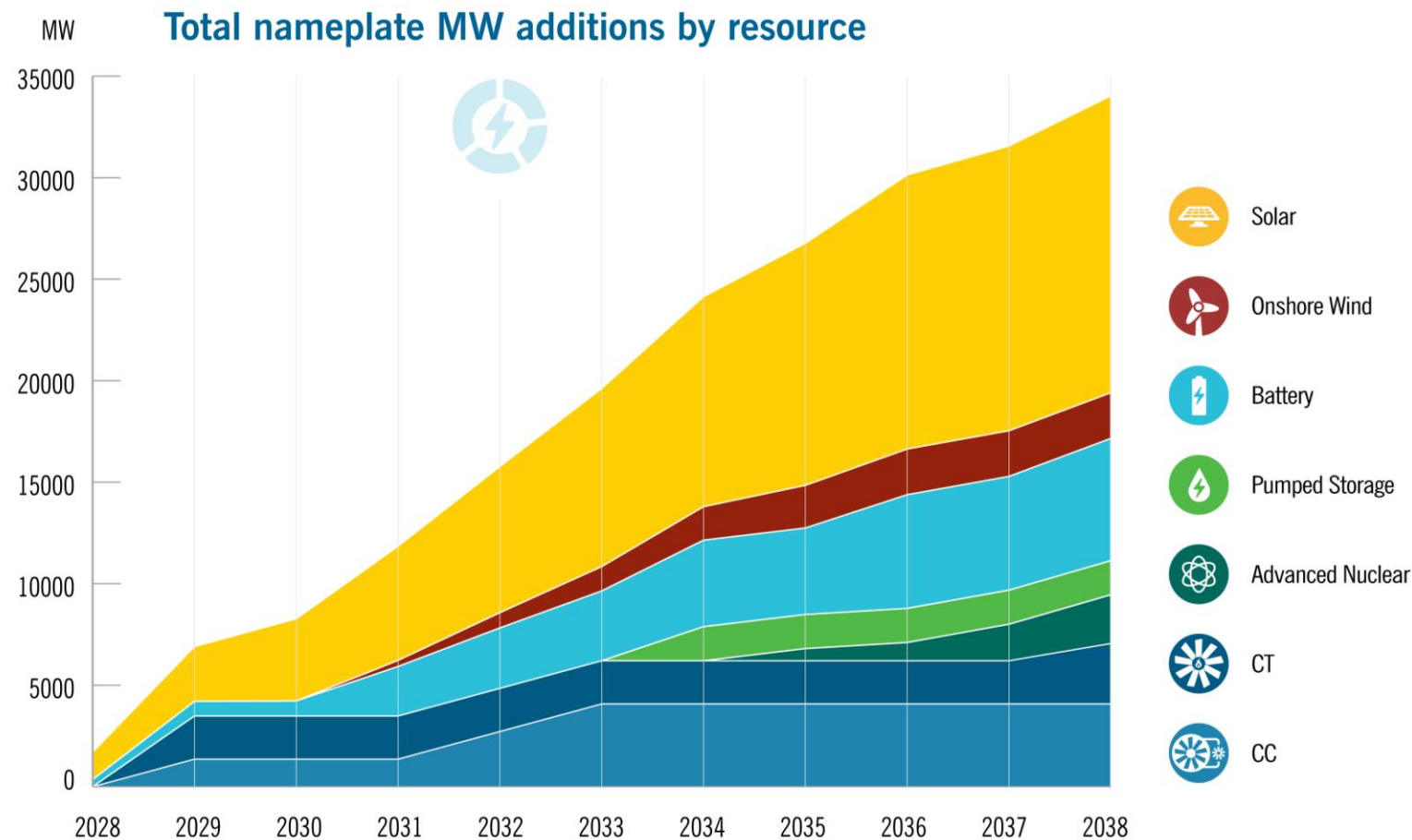
**Near Term Actions
Represent Reasonable
Steps to Execute Plan and
Achieve
Carbon Emissions
Reductions**



P3 Pursues Reasonable Steps To Carbon Reductions



Resource Additions Require Timely & Decisive Action (P3 Base)

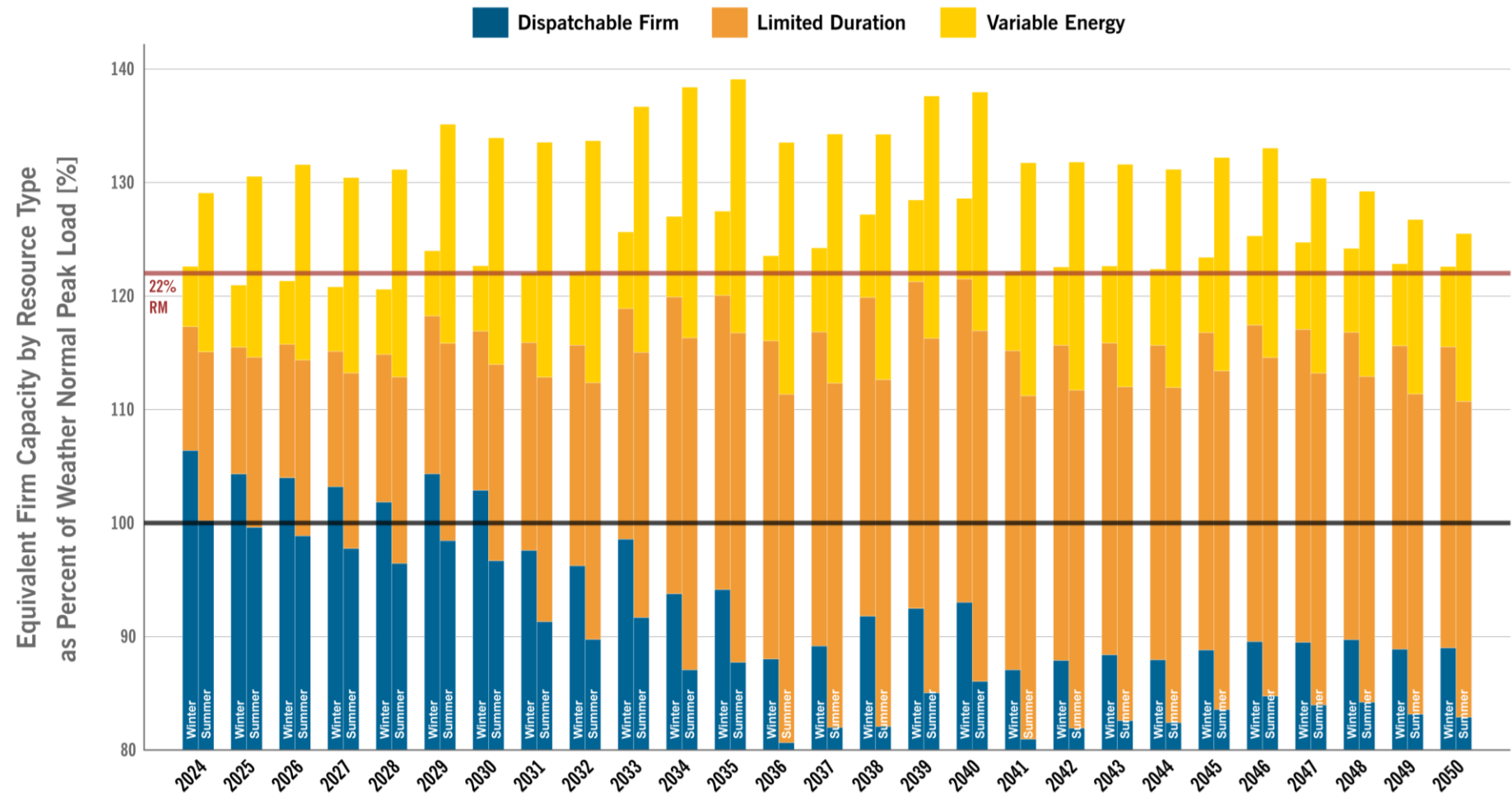


- Build plan is based on the P3 Core Portfolio, CC/CT are shown at winter ratings
- MWs shown are installed nameplate MW not adjusted for reliability equivalence

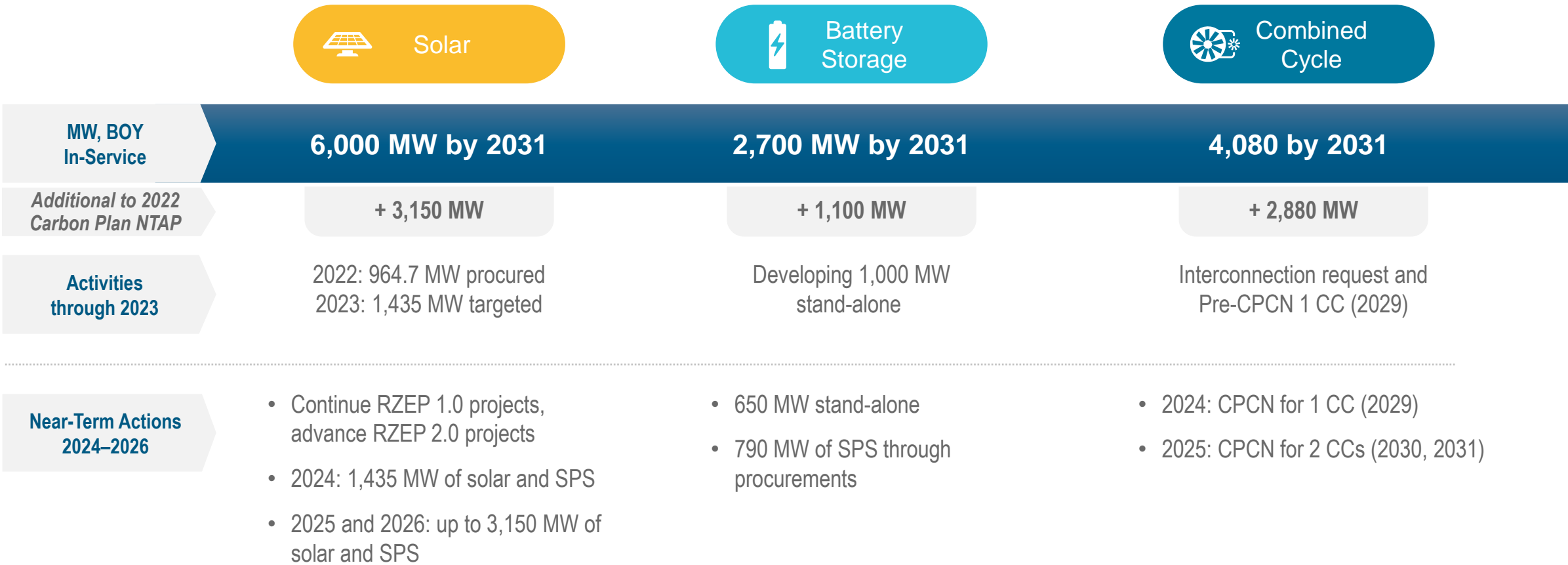
Continued Focus on Reliability with Increasing Reliance on Variable and Energy Limited Resources

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CPIRP Near-Term Action Plan



CPIRP Near-Term Action Plan (continued)

	<div> Combustion Turbine</div>	<div> Onshore Wind</div>	<div> Pumped Storage Hydro</div>
MW, BOY In-Service	1,700 MW by 2032	1,200 MW by 2033	1,700 MW by 2034
Additional to 2022 Carbon Plan NTAP	+ 900 MW	+ 1,200 MW	New to NTAP
Activities through 2023	Interconnection request and Pre-Certificate of Public Convenience and Need (“CPCN”) for 2 CTs total 900 MW (2029)	Carolinas site screening evaluation	<ul style="list-style-type: none">Interconnection request, equipment proposals, and construction estimatesFederal license activities
Near-Term Actions 2024–2026	<ul style="list-style-type: none">2024: CPCN for 2 CTs (2029)2025: CPCN for 1 CT (2030)2026: CPCN for 1 CT (2032)	Site feasibility studies and siting development engagement for 300, 450 and 450 MW per year, respectively	<ul style="list-style-type: none">2024: South Carolina Certificate of Environmental Compatibility and Public Convenience and Necessity (“CEPCN”)2025 and 2026: File North Carolina Out of State CPCN, file federal license application

CPIRP Near-Term Action Plan (continued)

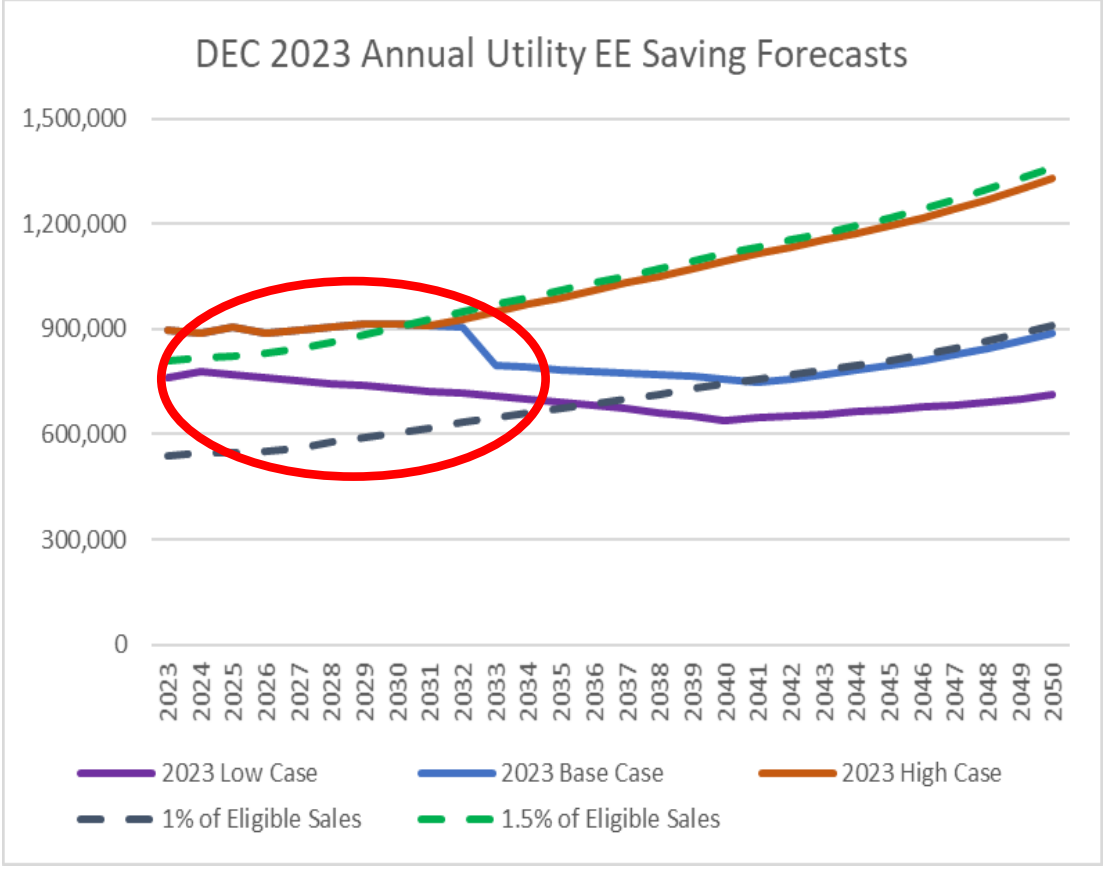
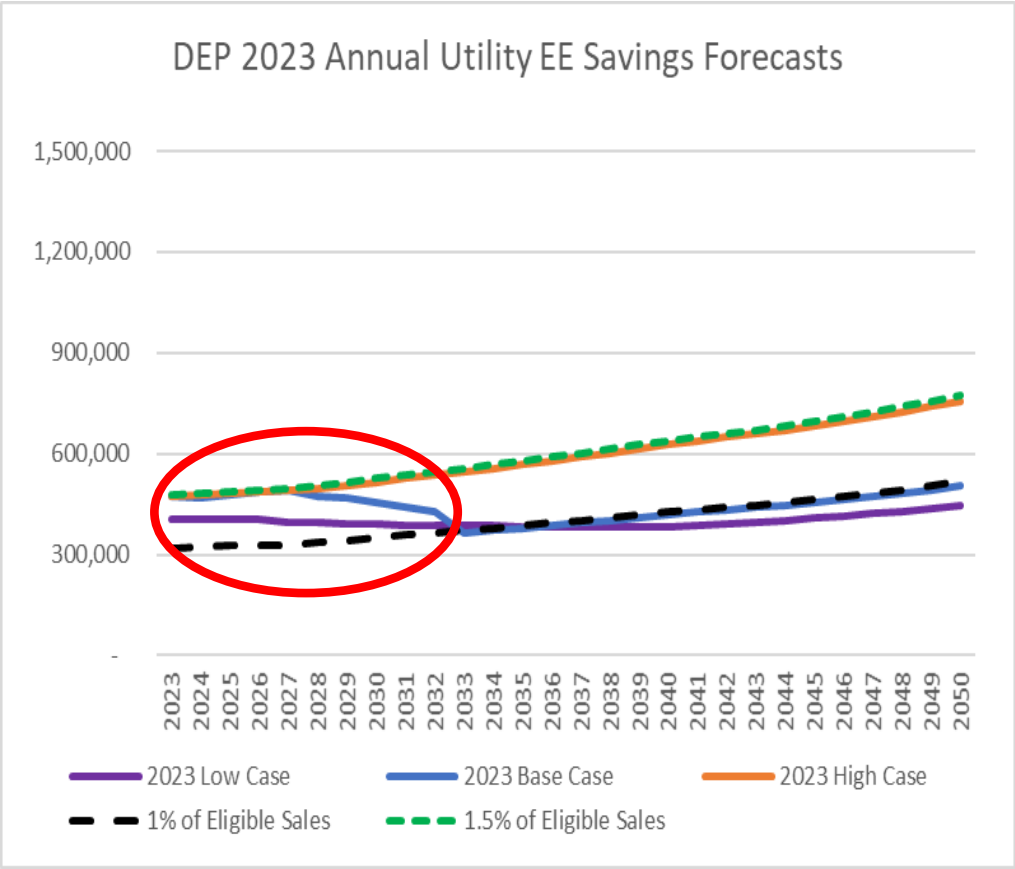
		Advanced Nuclear	Offshore Wind
MW, BOY In-Service		600 MW by 2035	Evaluate potential need for 2033-2038
Activities through 2023		<ul style="list-style-type: none">Evaluating reactor technologiesDeveloping Early Site Permit (“ESP”) for Site 1	<ul style="list-style-type: none">Evaluated three WEAs off North Carolina coastPartnered with NC State Energy Office to pursue IIJA funding
Near-Term Actions 2024–2026		<ul style="list-style-type: none">Site 1: Choose reactor technology, submit ESP, develop construction permit/license application, contract with reactor vendor, order long-lead equipmentSite 2: Develop and submit ESP, begin construction permit/license application	<ul style="list-style-type: none">Continue IIJA funding partnershipMonitor domestic market and supply chainEvaluate potential earlier resource need (0 to 1,600 MW) and make recommendation for RFP in 2025 or sooner based on the market conditions and need



Key Enabler Updates













Key Enabler: Future DSM and EE Impacts



○ Assumed impact of Inflation Reduction Act on EE savings

Status of Grid Edge Enablers From 2022 Carbon Plan Order

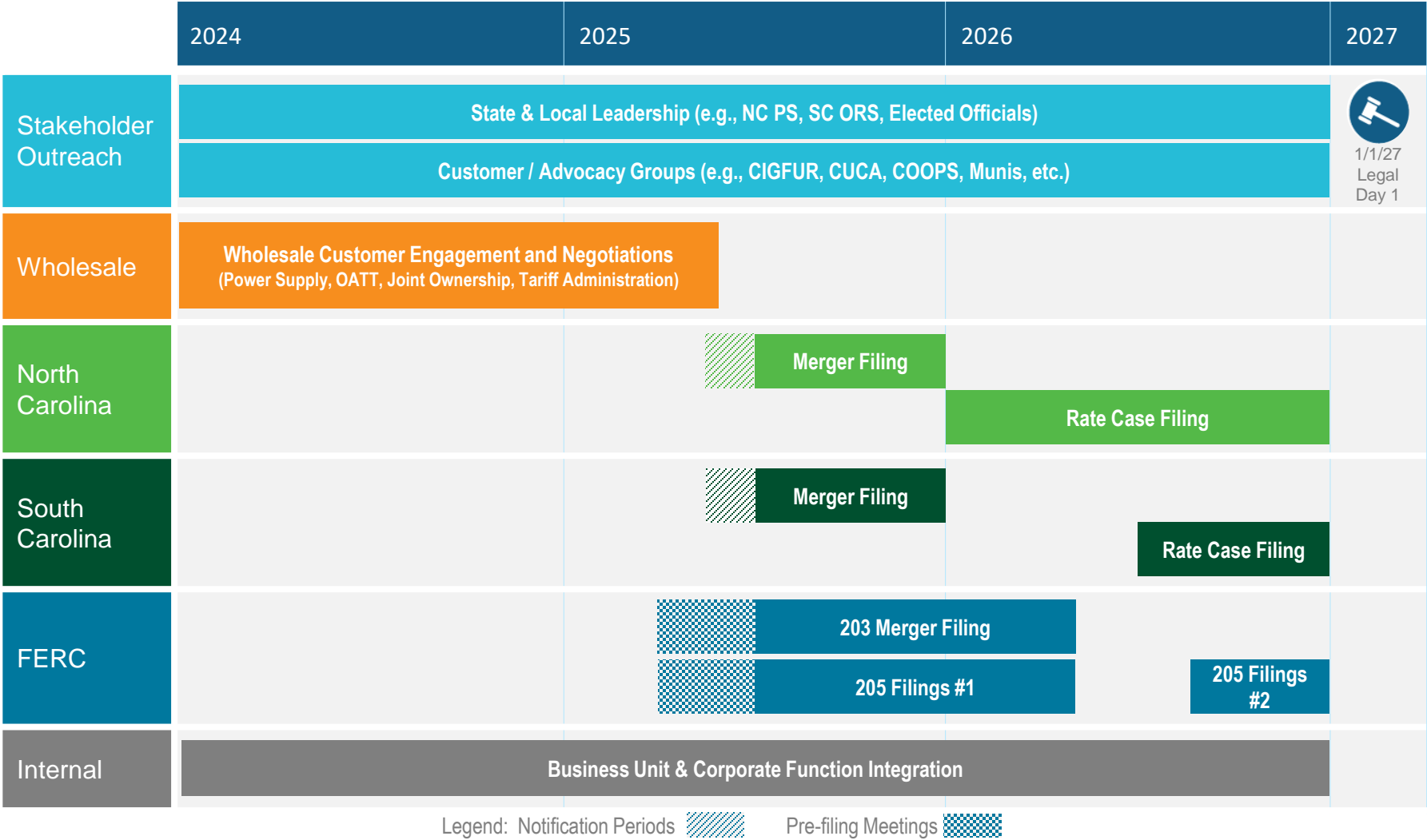
ACTION	NOTES
“As Found” Savings	 <ul style="list-style-type: none"> The NCUC approved the Smart Saver Early Replacement and Retrofit Program, which uses “as found” savings for evaluation, measurement, and verification purposes by Order issued Aug. 23, 2023.
Tariffed on Bill Repayment Plan	 <ul style="list-style-type: none"> The NCUC approved the Companies’ Tariffed On-Bill Repayment Plan on 8/23/23 in Dockets No. E-7, Sub 1279 and E-2, Sub 1309.
Initiation of Review of EE/DSM Cost Recovery Mechanism “As Found” Savings Updating Utility System Benefit Valuation Accelerated Pilot Process Expansion of Low-Income Program Eligibility	 <ul style="list-style-type: none"> On 4/27/23, Duke Energy filed a letter in Dockets E-7, Sub 1032 and E-2, Sub 931 to initiate a review of the EE/DSM Cost Recovery Mechanism. Duke Energy has shared its proposed modifications intended to address each of the listed enablers with stakeholders. The stakeholder meetings have begun and will be continuing.
Low Income Program Expansion	 <ul style="list-style-type: none"> On 3/1/23, the NCUC approved the DEC Income Qualified High Energy Usage Pilot in Docket E-7, Sub 1272 and the DEP Weatherization Program in Docket E-2, Sub 1299.
Additional Demand Response Option	  <ul style="list-style-type: none"> On-going evaluation of following additions to residential demand response programs: connected water heaters, heat strips and dual fuel systems, as well as additional non-residential demand response options for customers. Filed and currently pending approval: Income Qualified Residential Load Control Program, the proposed addition of a residential storage demand response option, as well as a modification to DEC PowerShare non-residential program to add an option informed by a California load control program.
Rapid Prototyping for Non-EE/DSM technologies	 <ul style="list-style-type: none"> Conducted stakeholder meeting to design the process beginning in March 2023 and anticipate filing a proposal for Commission approval in 4th Quarter 2023.
<div> <div>Approved </div> <div>Pending </div> <div>Strategy Under Development </div> </div>	

Key Enabler: Transmission Update



- Progressing on schedule with **RZEP 1.0 upgrades** with all projects planned in-service by mid 2027
- Planning to file **revisions to the Local Transmission Planning Process**, Attachment N-1 of OATT by early November
 - Transparency and coordination
 - Multi-value strategic transmission planning
 - Re-naming as Carolinas Transmission Planning Collaborative (CTPC) to better align with dual-state planning
- Introduced **RZEP 2.0 projects** based on 2022 DISIS Phase 1 study results
- Performing **2023 NCTPC study** to validate transmission expansion needed to execute resource plan and identify longer term potential greenfield transmission needs
- Continuing **interconnection process improvement** work

Key Enabler: DEC and DEP Merger





Wrap-up / Additional Q&A



Conclusion



- CPIRP challenge is greater – more resource needs to meet growth and maintain or improve adequacy and reliability
- Key enablers needed to meet CPIRP objectives
 - Shrinking the challenge through EE, DSM and customer programs
 - Advancing strategic transmission projects
 - Pursuing the merged utilities
- Portfolio P3 balances executability risk and costs while maintaining reliability – represents reasonable steps to carbon reduction through NTAP
- Ability to “check and adjust” in future CPIRP proceedings monitors risks and uncertainties – however, also need to pursue near-term actions
- Measurable and steady progress needed on NTAP to reliably meet growth and reduce carbon – and ensure a diverse mix of resources
 - Bring online 6,000 MW of solar and 2,700 MW of battery storage by 2031
 - Advance the development of 1,200 MW of onshore wind
 - Pursue powerhouse at Bad Creek II
 - Bring online one 1,360 MW CC by 2029, two 1,360 MW CCs by 2031
 - Bring online four CTs by 2032
 - Advance SMRs – site, permit, and begin construction on two sites (600 MW) through 2026
 - Closely monitor U.S. offshore wind market, making RFP recommendation in 2025 or sooner based on market conditions and need



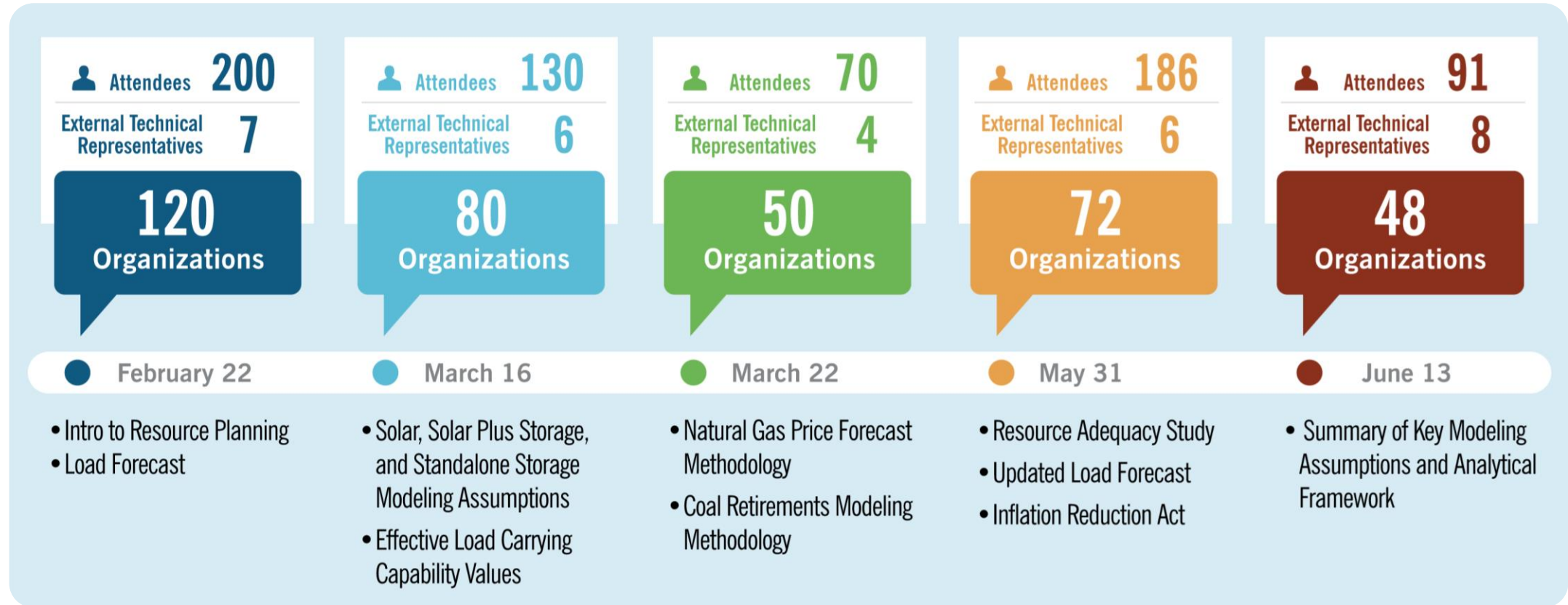
Appendix



2023 Resource Planning Stakeholder Engagement

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Developing a Resource Portfolio: Analytical Process

Develop Spring 2023 Model Inputs

Forecasts & Assumptions

- Load Forecast
- EE/DSM Forecasts
- Fuel Price Forecasts
- Resource Costs (fixed & variable)
- Unit Configurations & Constraints
- Carbon Reduction Targets*
- IRA impacts
- Many Others...

Supporting Studies & Analysis

- EE/DSM Market Potential
- Resource Adequacy (Reserve Margin)
- Effective Load Carrying Capacity (ELCC)
- Coal Retirements
- Solar Interconnection Capability

Long-Term Planning Models

ENCOMPASS
POWER PLANNING SOFTWARE

Capacity Expansion
(Preliminary Portfolio)



Production Cost
(Hourly Dispatch)

Reliability Verification









- Strategic Energy & Risk Valuation Model (SERVM)
- Evaluate portfolio reliability over 43 weather years, including extreme winter temperatures
- Each weather year is simulated 50 times using a different forced outage scenario for each simulation

Cost Calculations

- Cumulative long-term costs expressed as PVRR
- Residential customer bill impact estimate at two snapshots in time

*reviewing PSCSC directive related to developing a portfolio assuming no constraints on carbon emissions

Near-Term Action Plan

Resource	MW, BOY In-Service	Activities through 2023	Near-Term Actions 2024–2026
 Solar	6,000 by 2031	2022: 964.7 MW procured 2023: 1,435 MW targeted	<ul style="list-style-type: none"> - Continue RZEP 1.0 projects, advance RZEP 2.0 projects - 2024: 1,435 MW of solar and SPS - 2025 and 2026: up to 3,150 MW of solar and SPS
 Battery Storage	2,700 by 2031	-Progressing development of 1,000 MW stand-alone -2023: 260 MW SPS targeted to procure	<ul style="list-style-type: none"> - 650 MW stand-alone - 790 MW of SPS through procurements
 Onshore Wind	1,200 by 2033	Carolinas site screening evaluation	Site feasibility studies and siting development engagement for 300, 450 and 450 MW per year, respectively
 CT	1,700 by 2032	Interconnection request and Pre-Certificate of Public Convenience and Need (“CPCN”) for 2 CTs total 900 MW (2029)	<ul style="list-style-type: none"> - 2024: CPCN for 2 CTs (2029) - 2025: CPCN for 1 CT (2030) - 2026: CPCN for 1 CT (2032)
 CC	4,080 by 2031	Interconnection request and Pre-CPCN for 1 CC (2029)	<ul style="list-style-type: none"> - 2024: CPCN for 1 CC (2029) - 2025: CPCN for 2 CCs (2030, 2031)
 Pumped Storage Hydro	1,700 by 2034	<ul style="list-style-type: none"> - Interconnection request, equipment proposals, and construction estimates - Federal license activities 	<ul style="list-style-type: none"> - 2024: South Carolina Certificate of Environmental Compatibility and Public Convenience and Necessity (“CECPN”) - 2025 and 2026: File North Carolina Out of State CPCN, file federal license application
 Advanced Nuclear	600 by 2035	<ul style="list-style-type: none"> - Evaluating reactor technologies - Developing Early Site Permit (“ESP”) for Site 1 	<ul style="list-style-type: none"> - Site 1: Choose reactor technology, submit ESP, develop construction permit/license application, contract with reactor vendor, order long-lead equipment - Site 2: Develop and submit ESP, begin construction permit/license application
 Offshore Wind	Evaluate potential need for 2033-2038	<ul style="list-style-type: none"> - Evaluated 3 WEAs off North Carolina coast - Partnered with NC State Energy Office to pursue IIJA funding 	<ul style="list-style-type: none"> - Continue IIJA funding partnership - Monitor domestic market and supply chain - Evaluate potential earlier resource need (0 to 1,600 MW) and make recommendation for RFP in 2025 or sooner based on the market conditions and need



BUILDING A *SMARTER* ENERGY FUTURE®

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing *October 12, 2023 Technical Conference Presentation* as filed in Docket No. E-100, Sub 190 were served electronically upon all parties of record.

This, the 13th day of October, 2023.

/s/ E. Brett Breitschwerdt
E. Brett Breitschwerdt
McGuireWoods LLP
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Raleigh, North Carolina 27601
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*Attorney for Duke Energy Carolinas, LLC
and Duke Energy Progress, LLC*

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