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March 9, 2021

VIA ELECTRONIC FILING

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

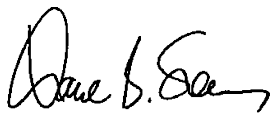
RE: Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Revised Presentation at ISOP Technical Conference
Docket No. E-100, Sub 165

Dear Ms. Campbell:

I enclose for filing the revised presentation materials that Duke Energy Carolinas, LLC and Duke Energy Progress, LLC presented at the March 9, 2021 ISOP Technical Conference scheduled by the Commission in connection with the referenced matter.

Thank you for your attention to this matter. If you have any questions, please let me know.

Sincerely,



Lawrence B. Somers

Enclosure

cc: Parties of record

Presentation to NCUC Technical Conference on Comprehensive Electricity Planning

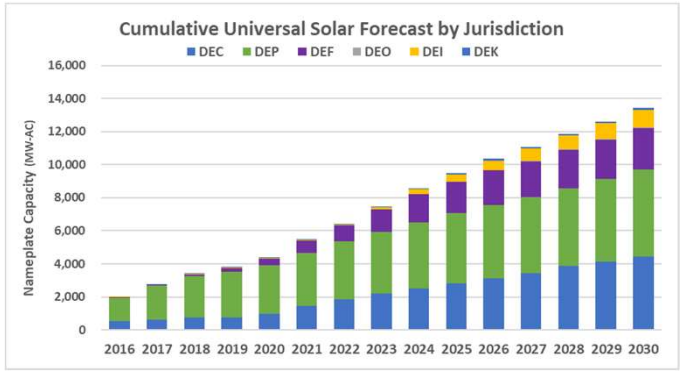
An Overview of Duke Energy's Integrated System & Operations Planning Development Efforts

March 9, 2021

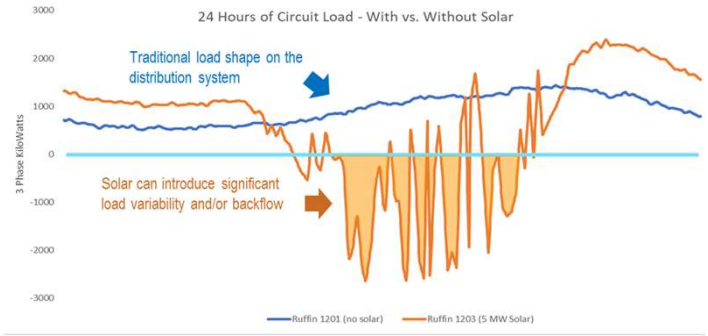
DUKE ENERGY®

What are some of the challenges that we are addressing?

Rapid growth of renewables in our regions …



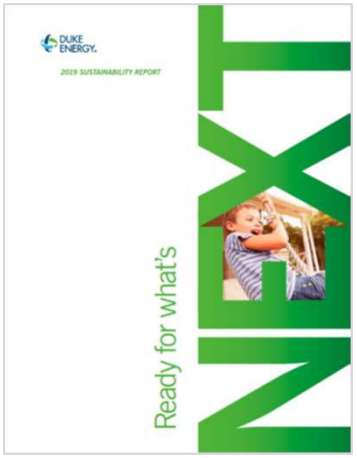
Addressing dynamic loading on the grid …



ISOP is leveraging IRP, ESG and sustainability efforts to frame the future for integrated planners …

➡ *Vision Statement …*

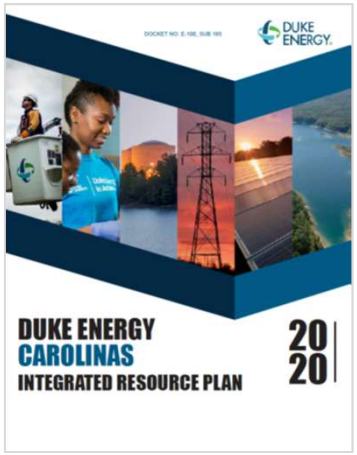
Net Zero Carbon by 2050



2019 Sustainability Report

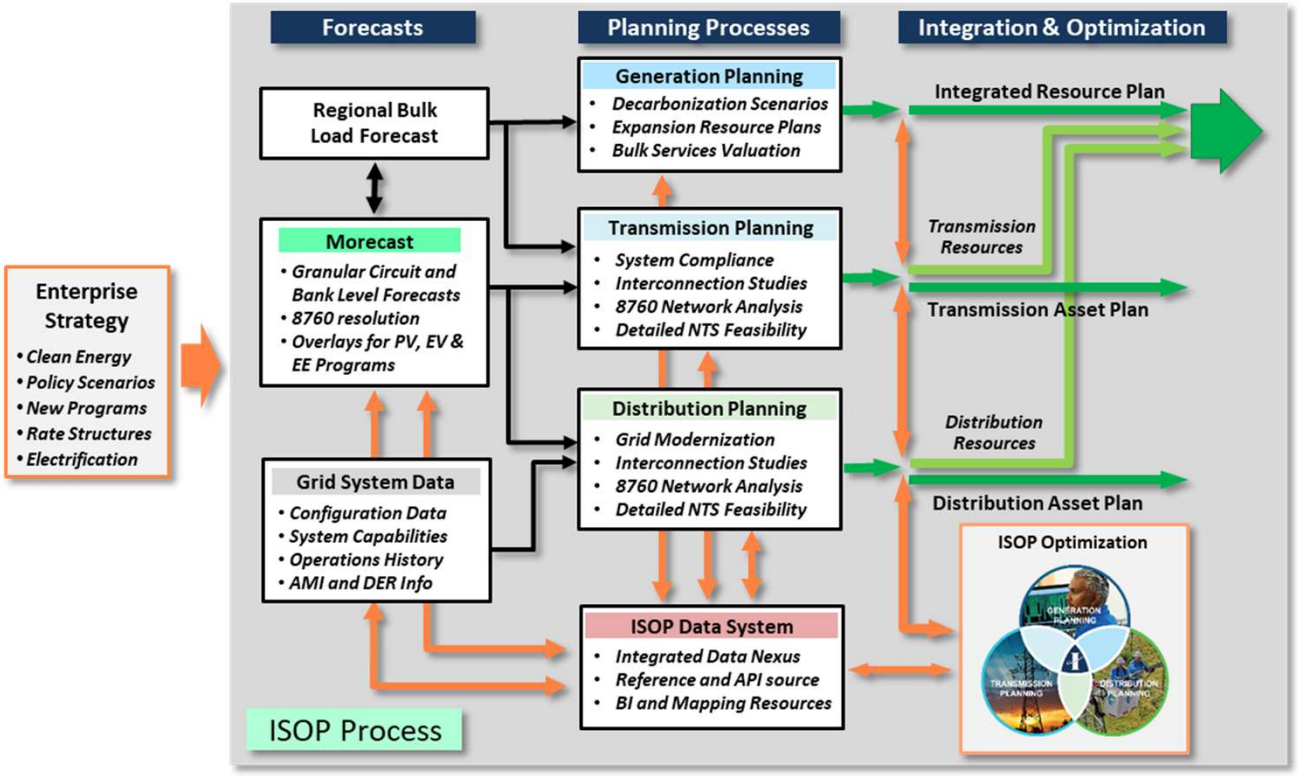
➡ *Integrated Planning …*

Pathways to Net Zero



2020 Integrated Resource Plan

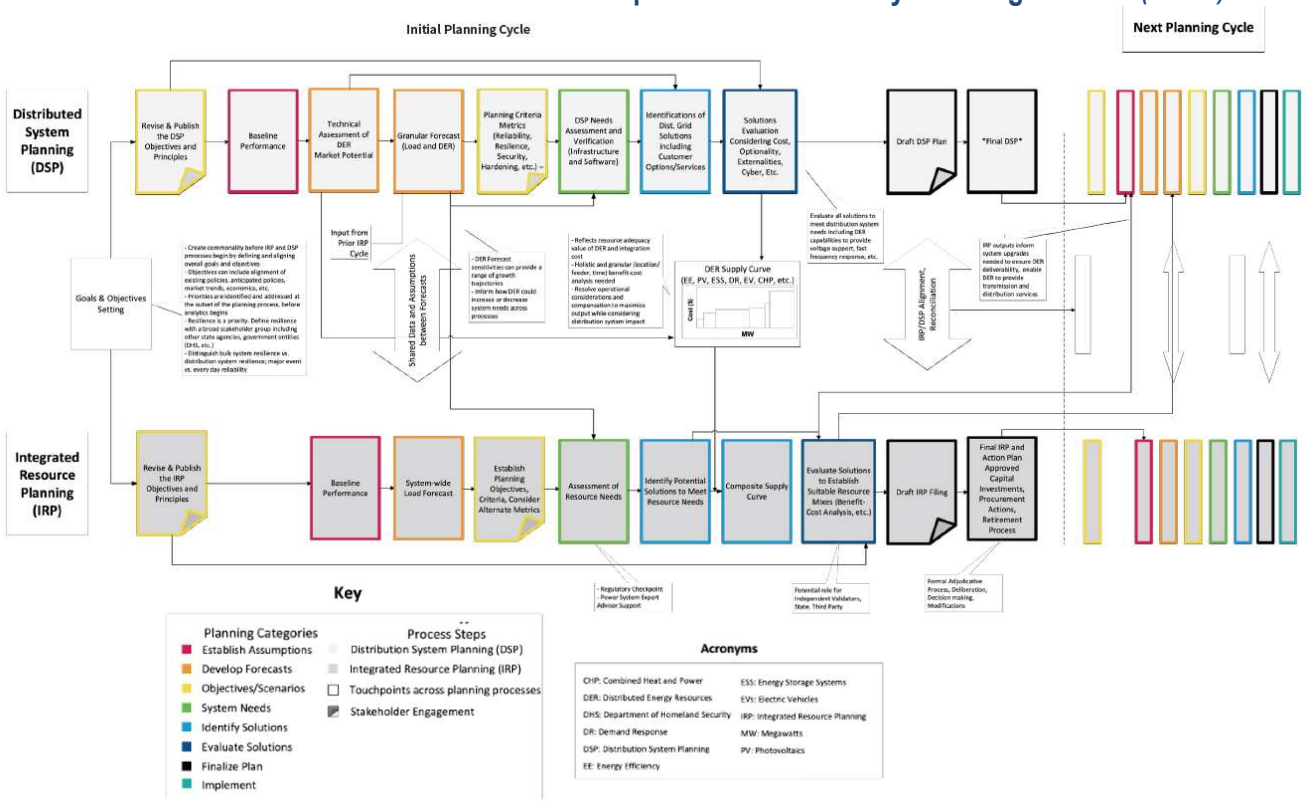
Developing the ISOP integrated electricity planning process



ISOP is supporting the development and integration of these new processes and methods in each of these planning areas.

Perspectives from the NARUC NASEO Task Force

Silver Cohort Flowchart of Idealized Comprehensive Electricity Planning Process *(Feb'21)*



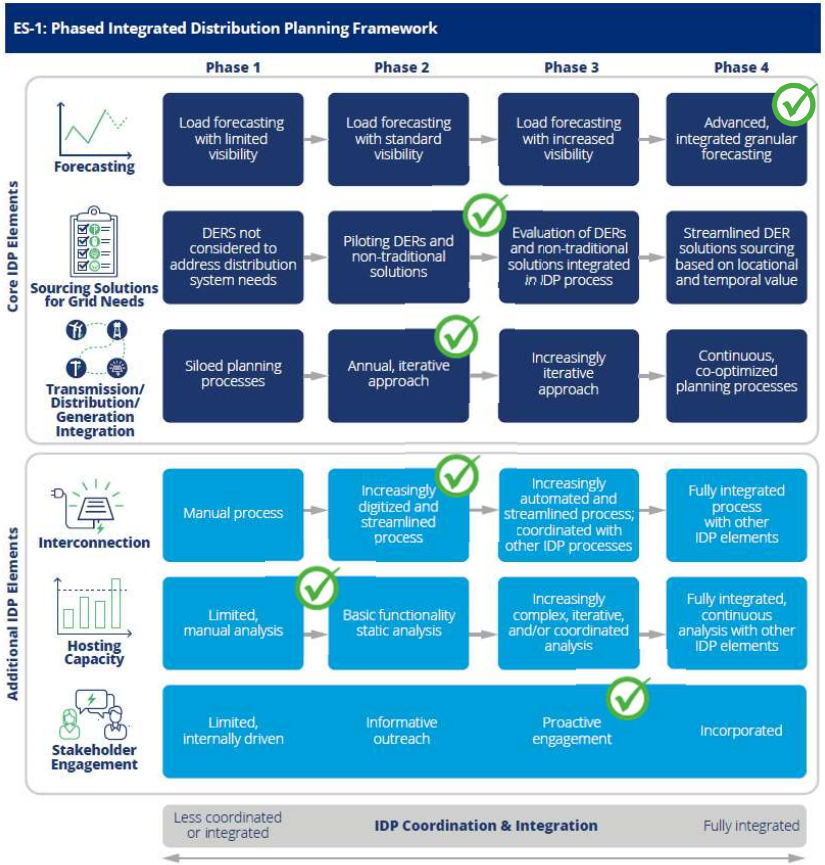
Alignment of ISOP elements

- Stakeholder engagement in the planning process
- Granular forecasting of load and DER
- Integrated needs analysis across D, T and G planning
- Integrating alternatives in the IRP process

Utility Collaboration

- Coordination on load and DER forecasting and DO / TO coordination with NCEMC, Electricities
- Investigating additional opportunities …

Progress in SEPA Integrated Distribution Planning Framework



Source: Smart Electric Power Alliance, 2020.

- Working to integrate granular load forecasting
- Developing process to evaluate non-traditional distribution solutions
- Developing coordinated planning timelines linking G, T, D
- Evaluating interconnection requirements for dynamic DER
- Evaluating process and requirements for hosting analysis
- Proactive stakeholder engagement

ISOP Development - Granular Load Forecasting

Weather
Historical and "normal" temperatures

Economic Variables
GDP, Business GDP, Population, Housing, Income, Employment

Load History
Metered Circuit data with adjustments for impacts from DR, EV & PV

Customer Demographics
Types of customers, number of customers, etc.

Energy Dynamics Segments
Customer's attitude towards energy

Morecast: New internal tool being developed to provide 10-year hourly (8760) forecasts at the circuit level

- *Morecast is a critical input to the advanced distribution planning tools being developed*
- Bottom-up feeder-level forecasts inclusive of DERs, EVs and customer programs (gross and net load)
- Load forecasters and distribution planners collaborating to produce informed forecasts
- Increasing availability of AMI data will influence and enhance the process

ISOP Development – Advanced Distribution Planning (ADP)

Integrating sophisticated granular load forecasts

- Current 3-5 year window evolving to 10 years
- New capabilities for multiple planning scenarios

New power flow resolution

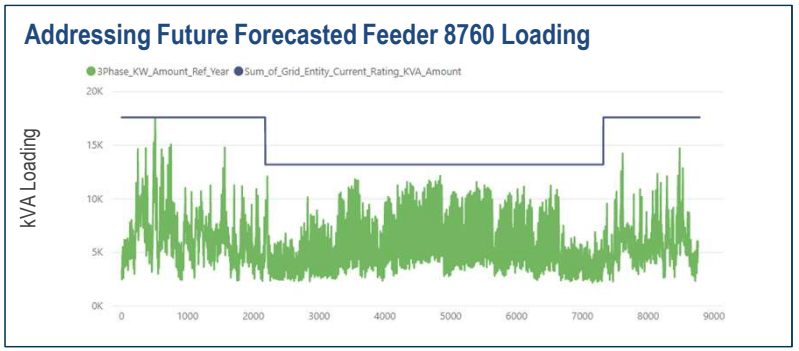
- From peak hour assessment to 8760 assessment

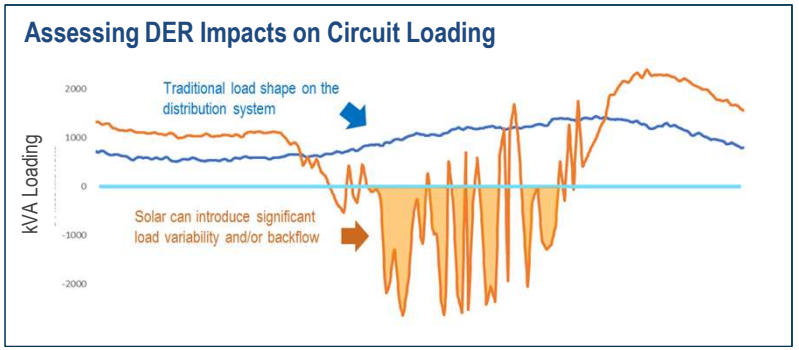
Assessment of new solutions

- DERs including battery storage systems
- Capture benefits of D-sited options for G and T

Integration and automation of new tools and data

- New server based power flow models and integration
- Supports more complex planning for a dynamic grid
- Tools and processes will evolve as planning needs change





ISOP Development – Advanced Distribution Planning (ADP)

Hybrid Solution

- Combines power flow software with advanced analytics capabilities
- Capable of engineering DERs as a Load Violation Solutions (non-wires alternative)

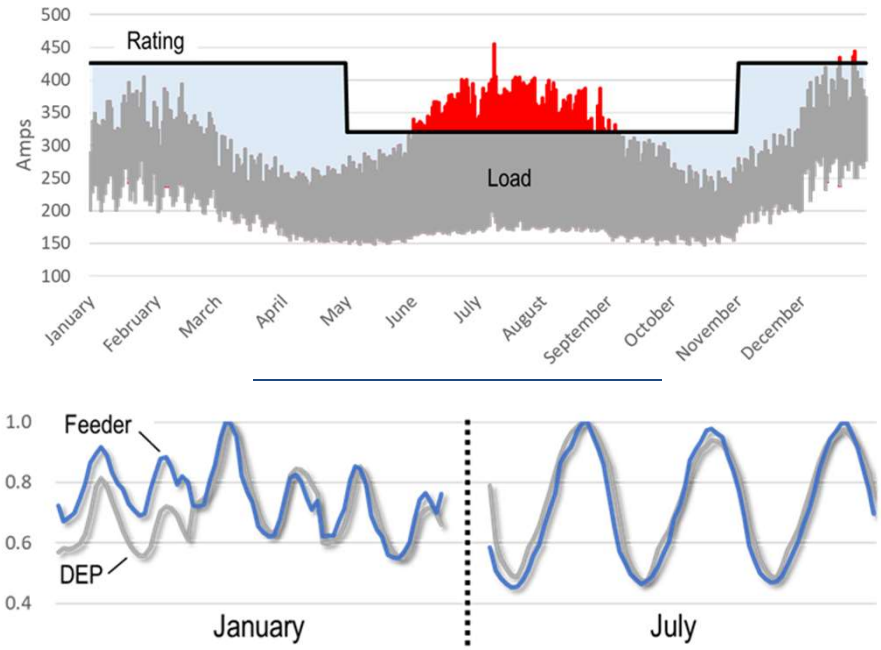
Introducing Automation

- Reduced engineering time spent resolving modeling issues and performing circuit analyses
- Time-saving analytics for identifying mitigation solutions to accommodate higher levels of DER
- Reduced engineering time when evaluating DER as a non-wires alternative
- Analysis of more solution alternatives and consistency in investment decisions

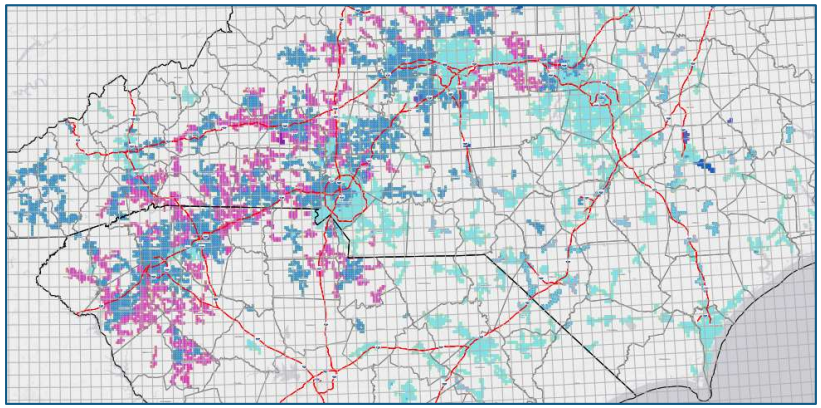
ADP Toolset – Carolinas System

New Advanced Distribution System Planning Applications

ISOP Data System Application: NTS Screening



Distributed Generation (DG) Guidance Map

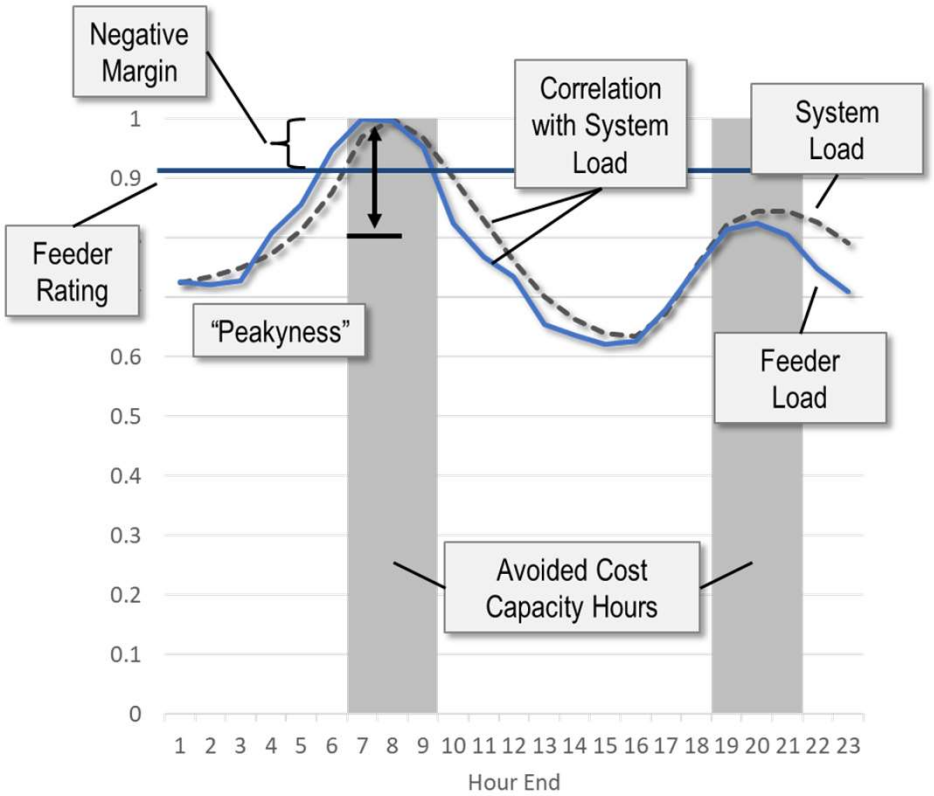


Map provides a geographical visualization of the distribution system in a manner consistent with the “Method of Service Guidelines” to inform siting of future distributed generation.

Advanced tools to assess non-traditional solution (NTS) deployment opportunities and increasing DER saturation

Top Down Screening for NTS Deployment Opportunities

Sample Normalized System and Feeder Load Shapes



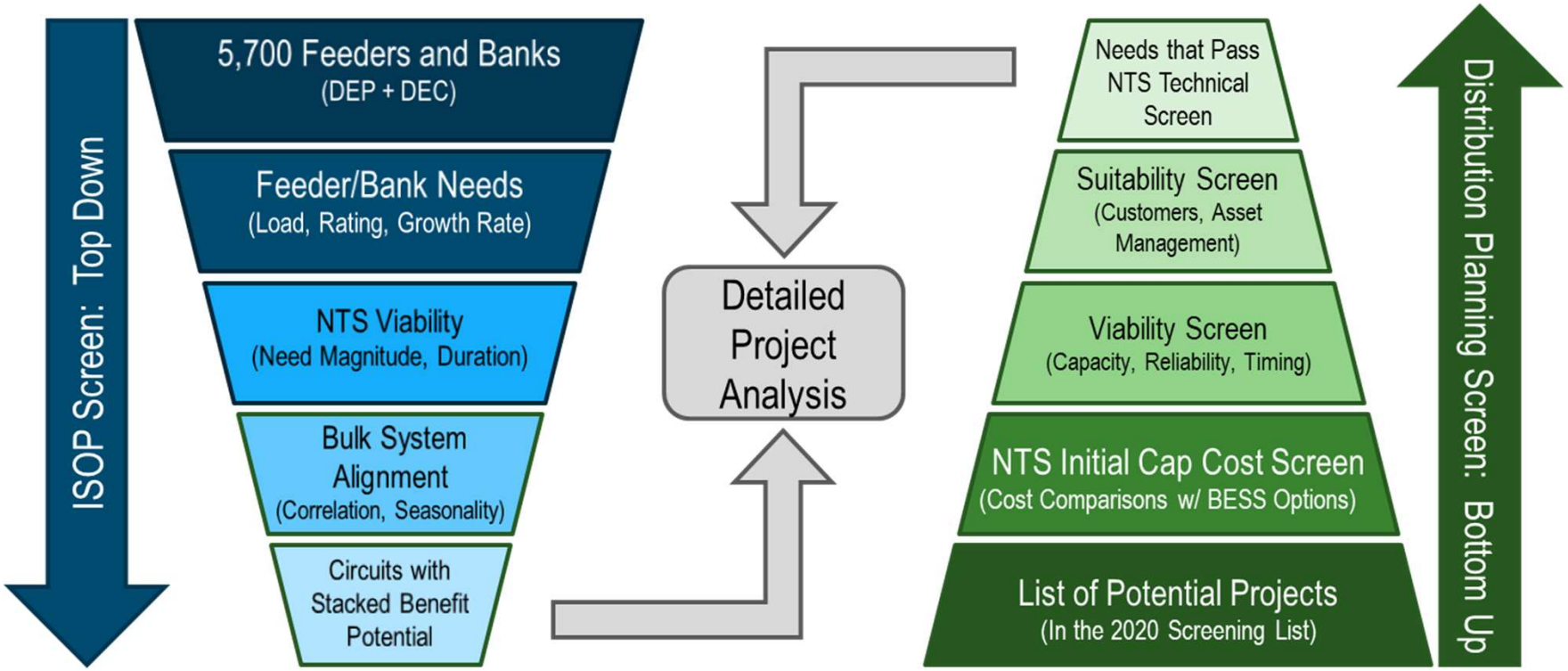
Additional Screening Criteria

- Load Growth
- Paired Feeder + Bank Overloads
- Connected PV

Initial Screening Results Using Straw-man Criteria

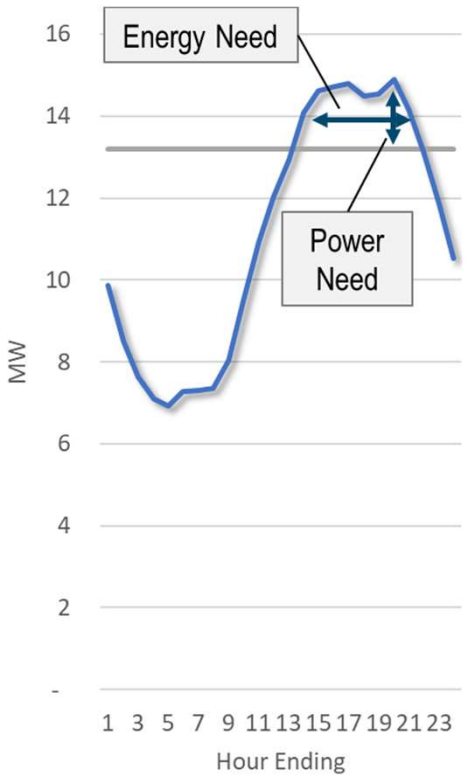
- 43 DEP feeders (~3%) at or close to overload in 2024
  - Load within 10% of rating, or
  - Load exceeds rating by not more than 5%
- Scored by:
  - Load "peakyness" (ratio of 99th percentile to mean)
  - Correlation with system load (hourly)
  - Alignment with capacity need (peaks during LOLE hours)
  - Load growth rate (magnitude of overload in 2028)

NTS Screening: Integrated Process

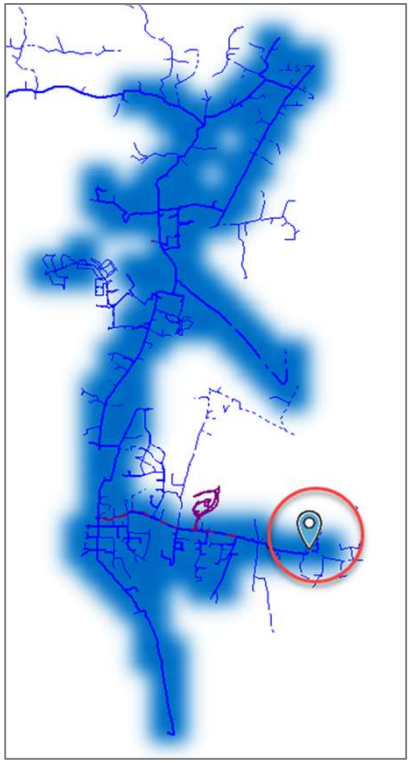


Case Study: Battery Sizing for Distribution Project Deferral

2028 Summer Peak



Location Analysis

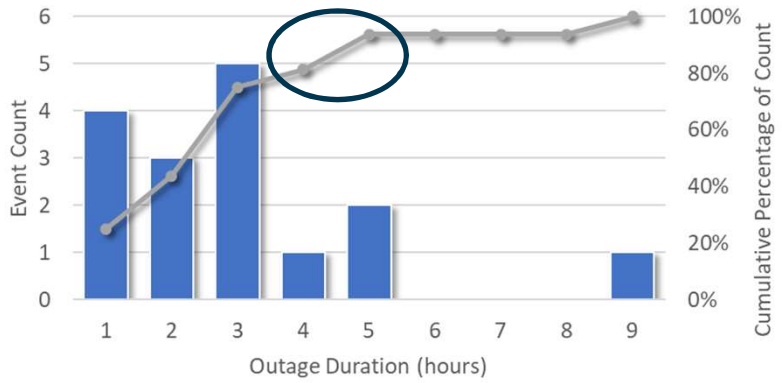


Battery Characteristics

	Units	
Primary Use Case		6-year Deferral
In-Service Year		2023
Useful Life	Years	12
Base Power Need	MW	5.4
Power Upsize		1x
Total Power	MW	5.4
Energy Need (usable energy)	MWh	44.4
Depth of Discharge	%	90%
Annual Degradation	%	3.25%
Installed Energy	MWh	59.8

Case Study: Battery Sizing for Customer Reliability

Outage Count by Duration (< 10 hours)



Estimated Energy Need by Outage Duration

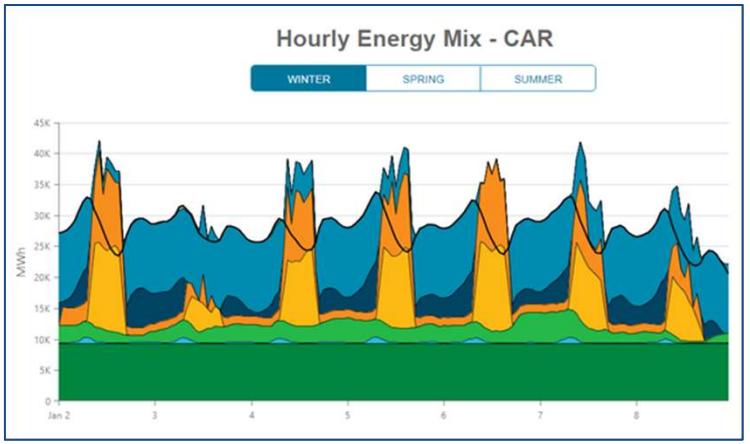
	3 Hours	4 Hours	5 Hours
99th Percentile MWh	3.9	5.2	6.5
90th Percentile MWh	3.1	4.1	5.0
75th Percentile MWh	2.3	3.1	3.8

Battery Characteristics

	Units	
Primary Use Case		Reliability
In-Service Year		2023
Useful Life	Years	12
Base Power Need	MW	1.9
Power Upsize		1.8x
Total Power	MW	3.4
Energy Need (usable energy)	MWh	4.1
Depth of Discharge	%	90%
Annual Degradation	%	3.25%
Installed Energy	MWh	6.7

ISOP Development – Integrating Generation and Grid Planning

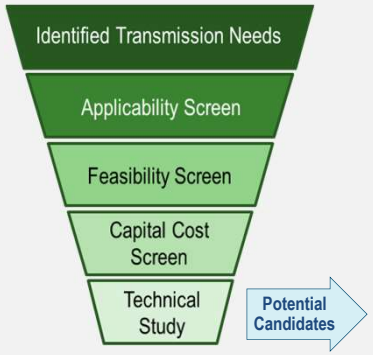
- Aligning and integrating generation resource planning with related planning functions
- Developing new tools for strategic transmission analysis to:
  - Reflect a system with significantly more distributed resources
  - Provide a more holistic view of future grid requirements associated with net-zero carbon operations
- Refinement of modeling to quantify ancillary services requirements associated with increasingly dynamic resource mix
- Transitioning to the EnCompass generation capacity expansion and system production cost modeling toolset
- Enhanced stakeholder engagement around generation resource planning, including the introduction of new tools like the Portfolio Screening Tool



ISOP Development – Transmission NTS Evaluation

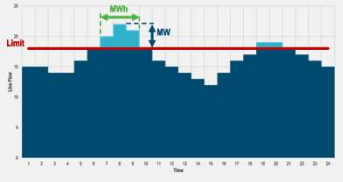
❶ NTS Screening

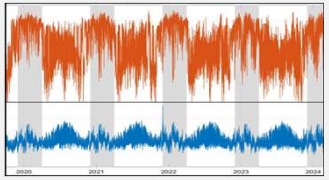
Screen for potential NTS alternatives to traditional projects being considered

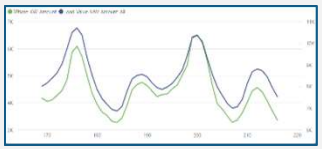


❷ Technical Feasibility (Phase 1)

- Model power flows to identify alternatives, BESS requirements and potential locations
- Evaluate BESS opportunity for potential additional energy and ancillary service value
- Evaluate BESS application for system capacity value







❸ Economics (Phase 1)

- Preliminary economic analysis of alternatives

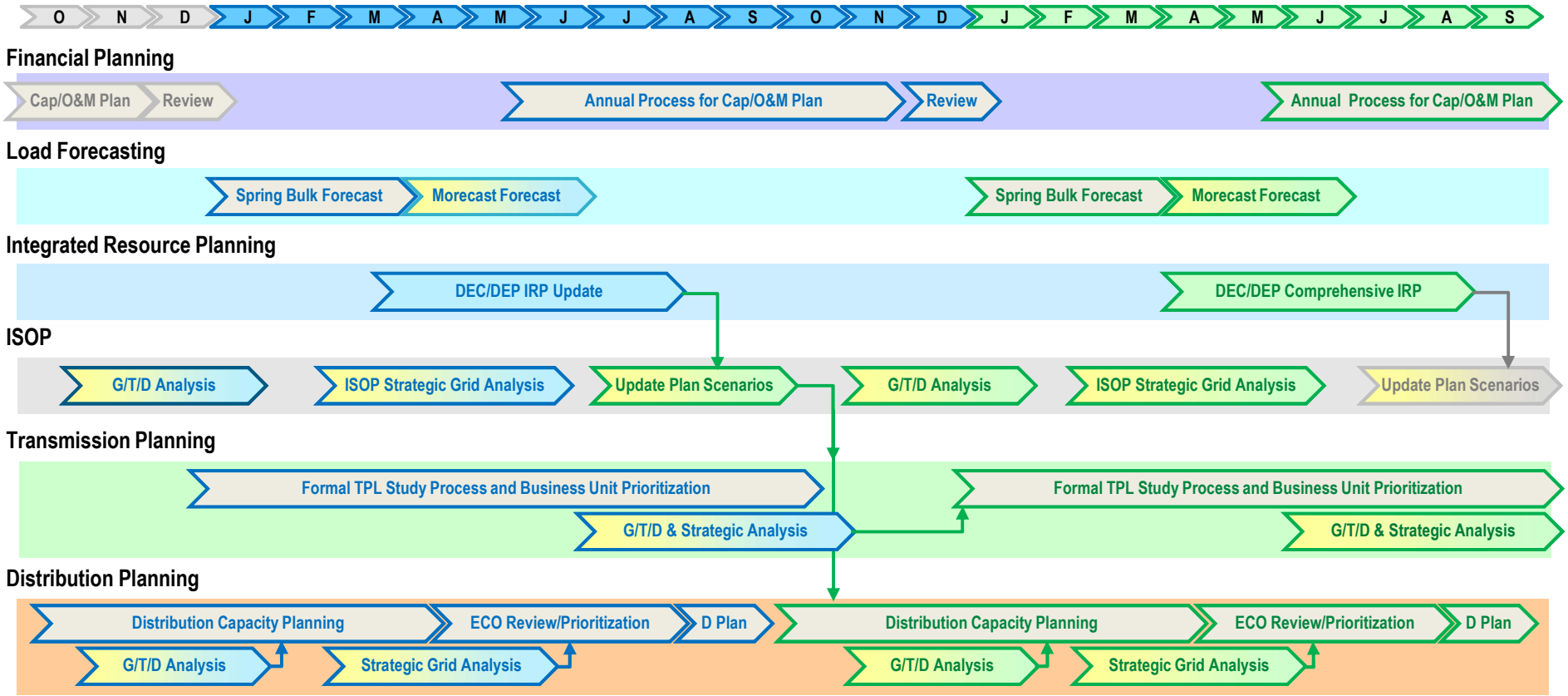
- Transmission planning review of system needs and priorities

❹ Next Steps (Phase 2)

- Detailed feasibility review

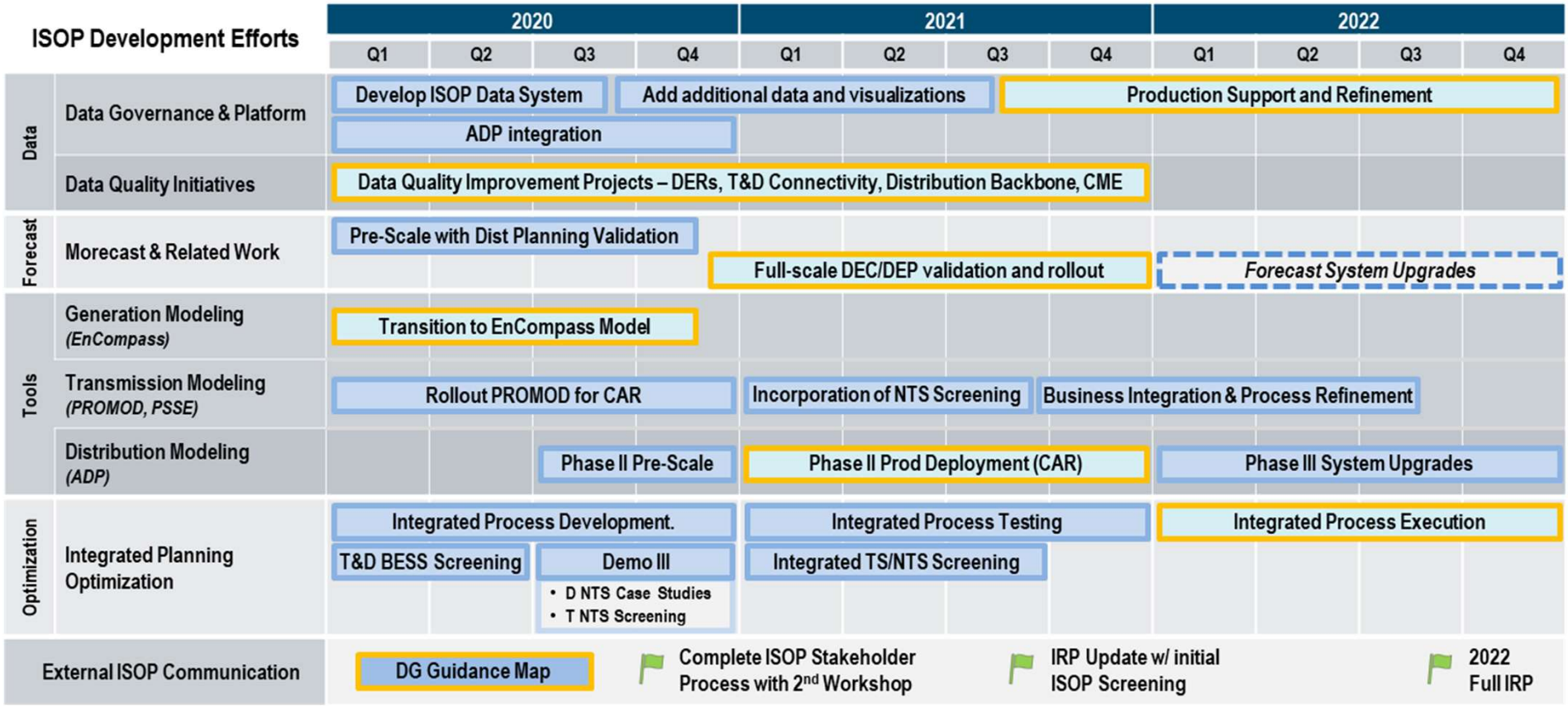
Advanced applications for Transmission Planning to assess dynamic grid operations and storage potential

ISOP Integration and Timeline Development



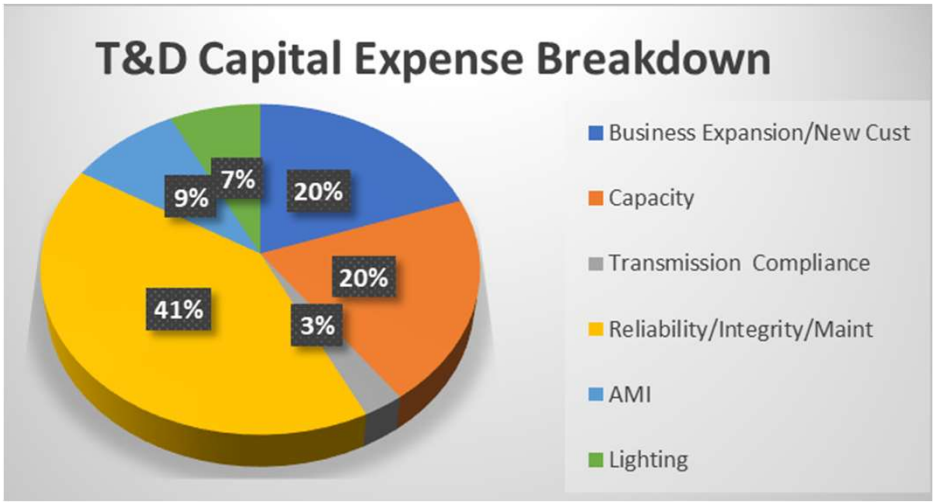
ISOP Timeline for the Carolinas

DUKE ENERGY



Observations from ISOP and activity in other states

- Importance of "right-sized" approach:
  - Opportunities for capacity deferral are a relatively small part of T&D capital expense
  - Screening results show a small percentage of these projects are candidates for detailed study in next ~3-5 years
  - Only 16% of 321 potential NWA projects in the United States have come into operation, and 59% of potential NWAs were ultimately not pursued
  - Demand side resources serving reliability functions involve more complexity and risk



- Approach should respect utilities' obligation to serve
- Walk → Jog → Run approach
- Protect customer data and grid security

Notes on ISOP's path forward

- Introduce ISOP elements to complement the 2022 IRP process in the Carolinas
- Continue to engage stakeholders in the Carolinas on development progress (https://www.duke-energy.com/our-company/isop)
- Continue to engage with industry peers and SMEs and benchmark against new practices in other regions
- Implement new components of the planning framework as capabilities mature
- Support regulatory policy initiatives

CERTIFICATE OF SERVICE

I certify that Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Revised ISOP Technical Conference Presentation, in Docket No. E-100, Sub 165, has been served by electronic mail, hand delivery or by depositing a copy in the United States mail, postage prepaid to the following parties of record

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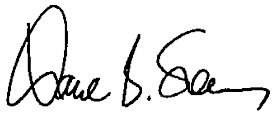
This the 9th day of March, 2021.



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