TAG Meeting
September 14, 2023

Webinar

TAG Meeting Agenda

1. Administrative Items – Rich Wodyka
2. 2023 Study Activities Update and Review of Preliminary Reliability Study Results – Orvane Piper and Sid DeSouza
3. Duke Energy Red-Zone Transmission Expansion Plan Projects (RZEP 2.0) – Sammy Roberts
4. Transmission Planning Process Attachment N-1 Report – Sammy Roberts
5. Regional Studies Update – Bob Pierce
6. 2023 TAG Work Plan – Rich Wodyka
7. TAG Open Forum – Rich Wodyka

2023 Study Activities and Preliminary Reliability Study Results

Orvane Piper – Duke Energy Carolinas

Sid DeSouza - Duke Energy Progress

Studies for 2023

- **Reliability Study**
  - Assess DEC and DEP transmission systems' reliability, and develop a single Collaborative Transmission Plan
- **Public Policy Study**
  - Combines aspects of the 2 Public Policy requests received.
    - Summarized on later slides

Reliability Study Scope

- **Base Reliability**
  - **Summer Peak Load**
    - **2028**
    - **2033**
  - **Winter Peak Load**
    - **2028/29**
    - **2033/34**

Reliability Study Process Steps

1. Assumptions Selected
2. Study Criteria Established
3. Study Methodologies Selected
4. Models and Cases Developed
5. Technical Analysis Performed
6. Problems Identified and Solutions Developed
7. Collaborative Plan Projects Selected
8. Study Report Prepared

Assumptions Selected

- **Study Years for reliability analyses, select from:**
  - **Near-term: 2028 Summer, 2028/29 Winter**
  - **Long-term: 2033 Summer, 2033/34 Winter**
- **LSEs provided:**
  - **Input for load forecasts and resource supply assumptions**
  - **Dispatch order for their resources**
- **Adjustments may be made based on additional coordination with neighboring transmission systems**

Study Criteria Established

- **NERC Reliability Standards**
  - **Current standards for base study screening**
  - **Current SERC Requirements**
- **Individual company criteria**

Study Methodologies Selected

- **Thermal Power Flow Analysis**
- **Each system (DEC and DEP) will be tested for impact of other system's contingencies**

Models and Cases Developed

- **Start with 2022 series of MMWG cases**
- **Latest updates to detailed models for DEC and DEP systems are included**
- **Planned transmission additions from updated 2022 Plan are included in relevant models**

Technical Analysis Performed

- **Conducted thermal screenings of the 2028S, 2028/29W, 2033S, and 2033/34W Base Reliability cases**

Problems Identified and Solutions Developed

Reliability Study Analysis

- Identified constraints and developed potential alternative solutions for further testing and evaluation
- Estimated project costs and schedule

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Parkwood 500/230 kV, Replace Bank 5	DEC	12/2024
New Breaker Station on Motley B 100 kV Line, Construct	DEC	12/2024
Island Creek 44 kV, Convert to 100 kV	DEC	12/2024
McDowell 230/100/44 kV, Replace Bank 2	DEC	6/2025

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Boyd 230 kV Switching Station, Construct	DEC	12/2025
Haas Creek 230 kV Switching Station, Construct	DEC	12/2025
Lyle Creek 100 kV Switching Station, Construct	DEC	12/2025
Page / Guilford B/W 100 kV (Greensboro-N Greensboro), Upgrade (4 miles)	DEC	6/2026

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Cabarrus B/W 100 kV (Wildcat-Westfork), Upgrade (3.1 miles)	DEC	6/2026
Sevier B/W 100 kV (E Greenville-Verdae Retail), Upgrade (4.5 miles)	DEC	12/2026
Oak Hollow 100 kV Switching Station, Construct	DEC	12/2026
Hands Mill 230 kV Switching Station, Construct	DEC	6/2027

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Earl B/W 100 kV (Transco Tap-Baldor Tap), Upgrade (2.7 miles)	DEC	6/2027
Batte B/W 100 kV (Concord-Concord City Del 1), Upgrade (1.7 miles)	DEC	6/2028
Tiger 230/100/44 kV, Replace Bank 5	DEC	6/2028
Kennedy B/W 100 kV (Orchard-Newton Tap), Upgrade (4.2 miles)	DEC	6/2028

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Harrisburg 230/100/44 kV, Replace Bank 3	DEC	Conceptual
Hodges 230/100/44 kV, Add 3rd Bank	DEC	Conceptual
Panther B/W 100 kV, Network (8.8 miles)	DEC	Conceptual
Pinewood B/W 100 kV (Lawsons Fork-Pinewood Retail), Upgrade (1.1 miles)	DEC	Conceptual

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Allison Creek B/W 230 kV (Newport-Catawba), Upgrade (5.2 miles)	DEC	Conceptual
Dan River B/W 100 kV (Dan River-N Greensboro), Upgrade (25.9 miles)	DEC	Conceptual
Oliver B/W 230 kV (Marshall-*Boyd), Upgrade (15 miles)	DEC	Conceptual
Reidsville / Wolf Creek B/W 100 kV (Dan River-Sadler), Upgrade (8.2 miles)	DEC	Conceptual

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Bethania / Shattalon B/W 100 kV (Rural Hall-Shattalon), Upgrade (5.6 miles)	DEC	Conceptual
Beulah B/W 100 kV (Lookout-EnergyUnited Del 18), Upgrade (5.5 miles)	DEC	Conceptual
Lookout B/W 100 kV (Lookout-*Lyle Creek), Upgrade (2.6 miles)	DEC	Conceptual
Hinkle B/W 100 kV (Stamey-Statesville), Upgrade, (6 miles)	DEC	Conceptual

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Concord B/W 100 kV (Concord-Concord City Del 3), Upgrade (5.5 miles)	DEC	Conceptual
Crab Orchard B/W 100 kV (Harrisburg-Amity), Upgrade (6.5 miles)	DEC	Conceptual

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Havelock 230/115 kV Transformer Banks 1 & 2, Replace with 336 MVA Banks	DEP	6/2024
Rocky Mount - Battleboro 115 kV line, Reconductor line (8.54 miles)	DEP	6/2025
Sumter Kings Hwy - Shaw Field Tap - DESC Eastover sections of Sumter-Eastover 115 kV line, Reconductor (6.48 miles)	DEP	6/2026
Maxton-Pembroke Section of the Weatherspoon-LOF 115 kV line, Reconductor (8.98 miles)	DEP	12/2026

New Projects in 2023 Plan

Reliability Project	TO	Planned I/S Date
Durham - RTP 230 kV line, Reconductor Durham - Brier Creek section	DEP	6/2027
Asheboro-Siler City 115 kV line, Reconductor (22.66 miles)	DEP	12/2028
Method - Milburnie 115 kV North line, Reconductor two sections (7.32 miles)	DEP	Conceptual
Rockingham - West End 230kV West line, Reconductor one section (7.96 miles)	DEP	Conceptual

2023 Base Reliability Study Preliminary Results (DEP & DEC Total)

TO	Number of New Projects in 2023 Plan	Estimated Total Cost ($M)
DEC	30	693.8
DEP	8	234.5
Total	38	928.3

Public Policy Study

- **2023 Public Policy Study**
  - **2033 Summer Peak, 2033/34 Winter Peak**
  - **Modified version of Portfolio P1**
    - **Retirement of fossil generation**
      - **DEC: Allen 1-5, Cliffside 5, Lee 3, Marshall 1-4**
      - **DEP: Roxboro 1-4, Mayo 1, Weatherspoon CTs, Blewett CTs**

Public Policy Study

- **2023 Public Policy Study (continued)**
  - **Modified version of Portfolio P1 (continued)**
    - **Incremental 12.5 GW of solar and solar + storage**
      - **70% DEP, 30% DEC**
      - **Locations based on historical Generator Interconnection Requests**
      - **Additional evaluation of 9.3 GW scenario**
    - **Onshore wind**
    - **Offshore wind (DEP)**
      - **New Bern**

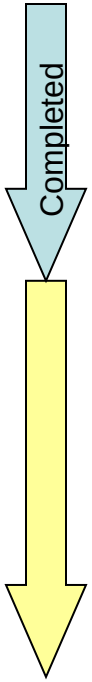
Public Policy Study

- **2023 Public Policy Study (continued)**
  - **Modified version of Portfolio P1 (continued)**
    - **Small Modular Reactor (SMR) (DEC)**
      - **Belews Creek**
    - **CC and CT**
      - **DEC: Marshall**
      - **DEP: Roxboro**
    - **Additional CTs, as needed, at existing generating facilities**

Public Policy Study

- **2023 Public Policy Study (continued)**
  - **Modified version of Portfolio P1 (continued)**
    - **Pumped Storage Hydro (DEC)**
      - **Bad Creek**
    - **Standalone Batteries**
    - **<u>New</u> Batteries Paired With <u>Existing</u> Solar**

Public Policy Study Process Steps



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4. Models and Cases Developed
5. Technical Analysis Performed
6. Problems Identified and Solutions Developed
7. Collaborative Plan Projects Selected
8. Study Report Prepared

Collaborative Plan Projects Selected

- Compare all alternatives and select preferred solutions

Study Report Prepared

- Prepare draft report and distribute to TAG for review and comment

Questions ?

Duke Energy Red-Zone Transmission Expansion Plan Projects (RZEP 2.0)

Sammy Roberts

Duke Energy

RZEP 2.0 Proposed Projects

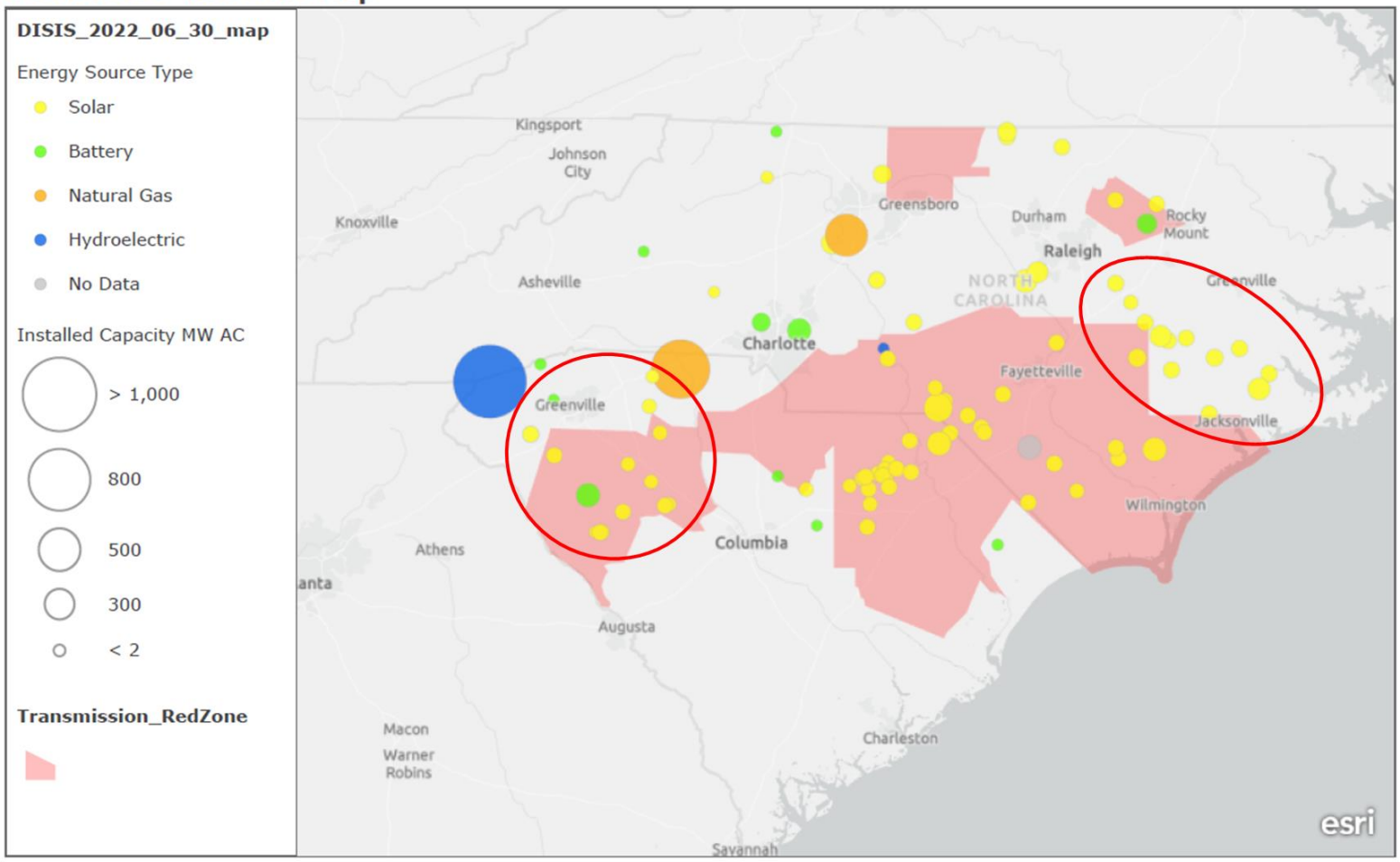
Project	Owner	Project Description	Cost Estimate	Potential In-Service Date
Broadway B/W 100 kV (Belton Tie-W.S. Lee Combined Cycle)	DEC	Rebuild	$19,749,000	May 2028
Bush River 115/100 kV Transformers	DEC	Upgrade	$8,523,000	May 2028
Champion B/W 100 kV (Bush River-New Berry PV)	DEC	Rebuild	$29,114,000	May 2028
Clayton Industrial - Selma 115 kV	DEP	Rebuild	$27,741,000	Sep 2028
Lilesville-Oakboro 230 kV Black	DEP	Rebuild	$54,470,000	Dec 2029
Lilesville-Oakboro 230 kV White	DEP	Rebuild	$54,470,000	Dec 2029

RZEP 2.0 Proposed Projects - CBAs

Transmission Line/Transformer	Upgrade Summary	Estimated Cost NPV ($M)	Estimated Benefit ($M)	CBA
Broadway B/W 100 kV	Reconductor to 1272 ACSR	15.352	84.8	6
Bush River 115/100 kV	Replace Banks 7 & 8	6.922	53.5	8
Champion B/W 100 kV	Reconductor to 1272 ACSR	22.636	87.6	4
Clayton Industrial - Selma 115 kV	Reconductor with 1590 ACSR	21.567	741.5	34
Lilesville - Oakboro 230 kV Black/White	Reconductor with 6-1590 ACSR	83.565	1,106.20	13

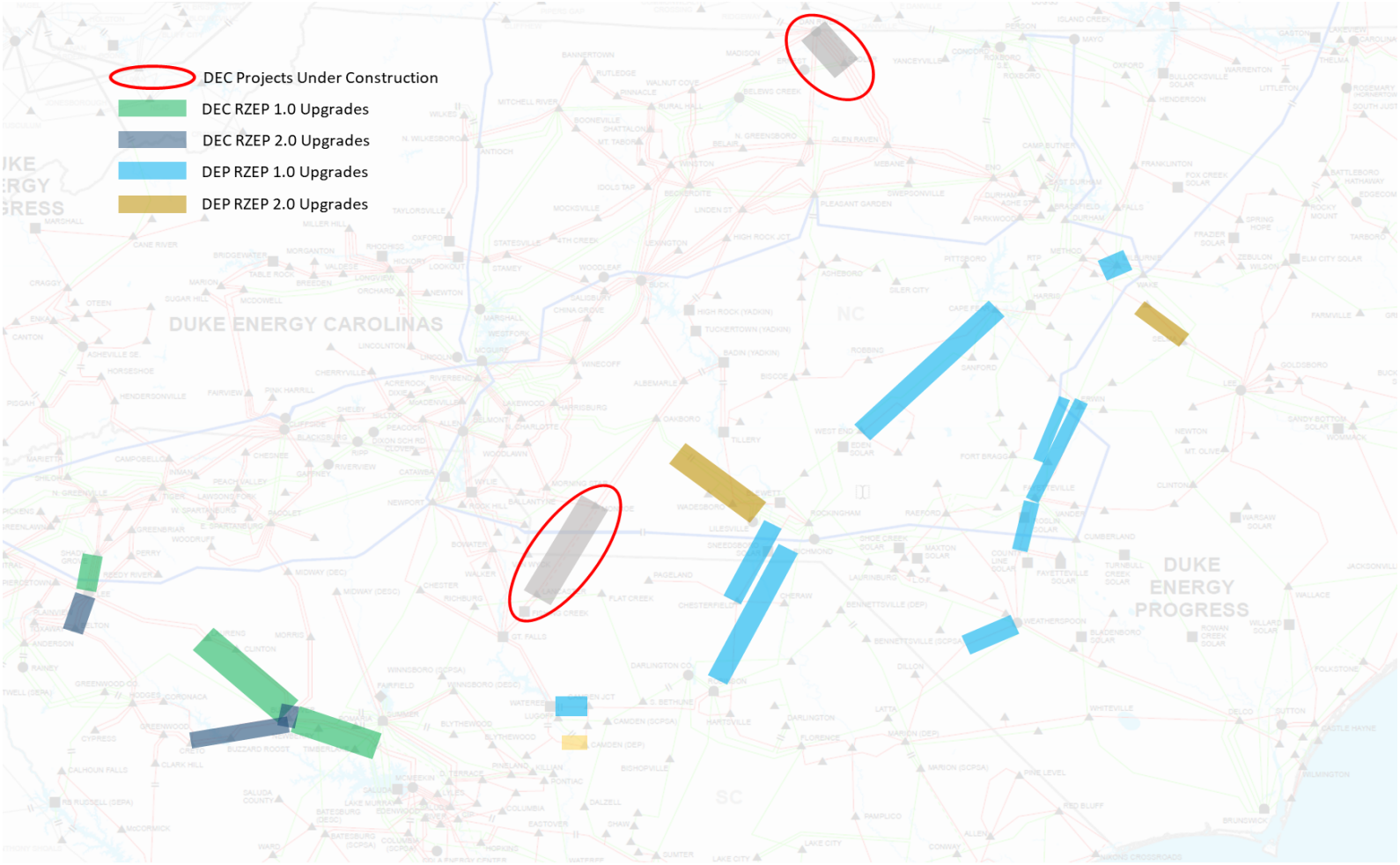
2022 DISIS Phase 1 Study

DISIS 2022 - Red Zone Map



Transmission Red Zone

RZEP Projects



Questions ?

Transmission Planning Process Attachment N-1 Revisions

Sammy Roberts

Duke Energy

NCTPC Planning Study Process Changes

Purpose: Adopt Practices from FERC NOPR and Other Regions' Transmission Planning Processes to enable least cost planning for resources and load

- Adopt attributes from FERC NOPR on Regional Transmission Planning Processes
  - Transparency and Coordination
    - Share models and associated data
  - Strategic transmission Planning
    - Long-term scenario planning that evaluates transmission needs based on changing resources and loads
    - Evaluate multi-value benefit streams for proposed projects to arrive at least cost recommendations that meet identified needs

NCTPC Planning Study Process Changes

Transparency and Coordination with the Local Transmission Planning Process

TAG Stakeholder Meetings

- **Assumptions Meeting** – NCTPC to review the criteria, assumptions, and methodology the PWG intends to use to identify needs and transmission solutions to include in the Local Transmission Plan
- **Needs Meeting** – NCTPC will review the identified system needs and the drivers of those needs, based on the application of its criteria, assumptions, and methodology in the Study Scope Document.
  - Models and sufficient information will be made available, subject to CEII and confidentiality restrictions, to enable TAG participants to replicate the results of planning studies reviewed at the Needs Meeting
- **Solutions Meeting** - NCPTC will review potential solutions and any alternatives considered as studied and identified by the PWG.

NCTPC Planning Study Process Changes

Four pathways with the Local Transmission Planning process…

1) Local Projects that are necessary to preserve reliability and comply with applicable reliability standards ("**Local Reliability Projects**"),
2) Local Projects that will increase transmission access to potential supply resources inside and outside the Control Areas of the Companies based on TAG participant requested economic studies ("**Local Economic Projects**")
3) Local Projects to satisfy Public Policy Requirements ("**Public Policy Projects**"); and/or
4) Local Projects that will integrate new generation resources and/or loads and provide other benefits in a least cost manner ("**Multi-value Strategic Transmission Projects**").

NCTPC Planning Study Process Changes

Results of Local Transmission Planning Process Changes

- A Carolinas Transmission Expansion Plan (CTEP) report reflecting the NCTPC study results will be published annually
- The CTEP is a local transmission plan that will be developed throughout the year considering input from OSC, PWG, and TAG stakeholder participants
- This report will reflect needed and coordinated transmission system expansion for:
  - local reliability requirements
  - economic transfers
  - public policy impacts
  - resource supply additions and retirements
  - load additions and changes (demand-side)
  - aging infrastructure replacement
- Strategic transmission planning, conducted at least once every three years for identified scenarios, will also be an input into the CTEP

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Transparency

- To increase engagement beyond the structured TAG meetings, the NCTPC should include an interactive forum on the TAG website for stakeholder input and comment, which would enable the ongoing vetting of issues. Ad hoc information requests may still be submitted and responsive discussion by e-mail or phone may still take place, but this online forum would provide an additional outlet for stakeholder commentary and discussion that involves all TAG members and stakeholders.
- New section 4 limits the definition of a Local Project to a transmission facility that, among other things, “is estimated to cost greater than $5 million.” However, this threshold will exclude a significant number of potential upgrades, limiting the ability of stakeholders to propose alternatives. Instead, the NCTPC should establish a cost threshold of $2 million. This corresponds with the practices of the other transmission planning process in the Carolinas, the South Carolina Regional Transmission Planning process.

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Recommended revisions to Section 4.5.1

- …the study process for Multi-Value Strategic Transmission Projects allows the OSC and TAG participants to propose different scenarios for evaluation of new resource supply options, changing load dynamics, transmission solutions requiring longer lead times, **generator retirements**, and/or economic development opportunities ("Strategic Planning Scenarios"). Strategic Planning Scenarios may consider, but are not limited to considering,(1)federal and state laws and regulations that affect the future resource mix and demand;(2)federal and state laws and regulations that affect decarbonization and electrification;(3) utility integrated resource plans approved pursuant to either N.C.G.S.§ 62-110.1 or S.C. Code Ann. § 58-37-40 and long-term expected supply obligations for load serving entities;(4)trends in technology and fuel costs within and outside of the electricity supply industry, including shifts toward electrification of buildings and transportation;(5) resource retirements **and replacements** or expiration of power purchase agreements;(6) generator interconnection requests and withdrawals,**(7) utility and corporate commitments and federal, state, and local goals that affect future resource mix and demand, and/or** (8)the need for transmission during high-impact, low frequency events.

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Multi-Value Strategic Transmission Planning

- There should be a **minimum of three total scenarios** considered in order to show a range of credible outcomes over a **20-year planning horizon** in order to develop a set of 'least regrets' transmission solutions that fulfill a range of needs into the future. Generation addition assumptions should be sufficiently robust and capture cost trajectories for which there is credible forecast data. Generation retirement and addition assumptions should be based on both announced utility plans and declining or ascending cost trajectories of resources. Interconnection requests that are in advanced stages of the queue process should be used to develop siting expectations, with future siting determined by resource availability (e.g., insolation, wind speed) and land availability. Load forecasts for each scenario should be based on credible assumptions forecasting multi-sector electrification and should consider outlier summer and winter peak conditions in forward-looking dynamic modeling to account for credible system stressors experienced in recent years (e.g., Winter Storms Elliott and Uri). Dispatch of energy storage resources in scenarios should capture realistic dispatch and charging patterns relative to summer and winter peak conditions.

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Multi-Value Strategic Transmission Planning

- Benefit metrics to be captured in the Multi-Value Strategic Transmission Planning process should be used for the purpose of assessing and qualifying projects for selection in the transmission plan. They should meet a 1.0 benefit-to-cost ratio assessed over a 40 year period aligning more closely with the 50-60 year lifespan of transmission assets.
- The following benefits should be assessed according to the following hierarchy, with the highest priority and analysis for inclusion given to Tier1 benefits, followed by Tier 2, and then Tier 3:

Tier 1 Economic Benefits

- Production Cost
- Congestion and Fuel
- Avoided capital costs of local resource investments
- Avoided transmission investment

Tier 2 Resource Adequacy Benefits

- Reduced resource adequacy requirements
- Avoided risk of load shedding

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Multi-Value Strategic Transmission Planning

- We propose that Multi-Value Strategic Transmission Projects be studied every two years instead of every three. So replace “triennial” with “biennial” in the first sentence of section 4.5.1. DEC and DEP are on 2-year cycles for a Carbon Plan and Integrated Resource Plan in North Carolina and 3-year cycles for an Integrated Resource Plan in South Carolina. The Multi-Value Strategic Transmission Projects will bring value to these processes, particularly if the results of the study are recent. A 2-year cycle, offset from the North Carolina 2-year resource planning cycle, will significantly help with coordination between these two processes.

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Multi-Value Strategic Transmission Planning

- We generally support the apparent intent of new Section 4.2.2.3 to create a process for stakeholders to introduce cost-effective and efficient resource and technology alternatives into the process. Proposed Section 4.2.2.3, as currently written, creates a process for TAG representatives to propose non-wires alternatives for consideration against transmission projects. **However, this section, as currently proposed, would unreasonably limit consideration of potentially more cost-effective and efficient solutions in two ways: 1- It would limit participation to TAG representatives only; and 2- It would limit consideration of alternative solutions to demand response OR generation resources in isolation, while disallowing any combination of such resources,** as well as a precluding consideration of a multitude of other technology and resource options and combinations. In short, as proposed, Section 4.2.2.3 would limit alternative proposals to one of two technology types, thus excluding resource and technology combinations and solutions that are currently available today, while also limiting participation of emerging, innovative, and cost-effective solutions in the future.

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Section 2.4.3.1 et seq. of Proposed Revisions

Many TPC procedures and requirements are set forth in external documents (e.g. the Participation Agreement and Scope documents) that are not part of the tariff. While we understand that having those documents outside the tariff provides additional flexibility, in the interest of transparency the OATT should provide that any changes to these documents are subject to review and comment by stakeholders.

NCTPC is working on draft revisions for affected non-OATT documents…

- *NCTPC Information and Data Request Form_redmark 090123.docx*
- *NCTPC Transmission Cost Allocation_redmark090123.docx*
- *OSC SCOPE_redmark 083123.docx*
- *PWG Scope_redmark 083123.docx*
- *Sixth Revised Participation Agreement_redmark090123.docx*
- *TAG Confidentiality Agreement_redmark 090123.docx*
- *TAG Scope_redmark 083123.docx*

NCTPC Planning Study Process Changes

TAG Stakeholder Feedback

Section 4.1 of Proposed Revisions

- The Local Transmission Plan should identify which projects are categorized as one or more of the different types of transmission projects delineated in Section 4.1.

NCTPC Planning Study Process Changes

Schedule for Local Transmission Planning Process Changes

March 15, 2023	June 21, 2023	August 2023	September 2023	October/ November 2023	2024
Reviewed Transmission Planning Process Change High-level Road Map with PWG, OSC and TAG and incorporated feedback	Presented and Collected Input on Local Transmission Planning Process Changes from PWG, OSC and TAG	Incorporate Descriptions of Local Transmission Planning Process Changes into the IRP Filings	Respond to TAG Input on Proposed Attachment N-1 Changes	File Changes to Attachment N-1 of the OATT with FERC to Align with Local Transmission Plan Process Changes	Implement Local Transmission Planning Process Changes Accepted by FERC

Questions ?

Regional Studies Reports

Bob Pierce

Duke Energy

SERC Long-Term Working Group Update

SERC Long-Term Working Group

- Working MMWG cases
- Completing 2023 study of 2028S

SERTP

SERTP

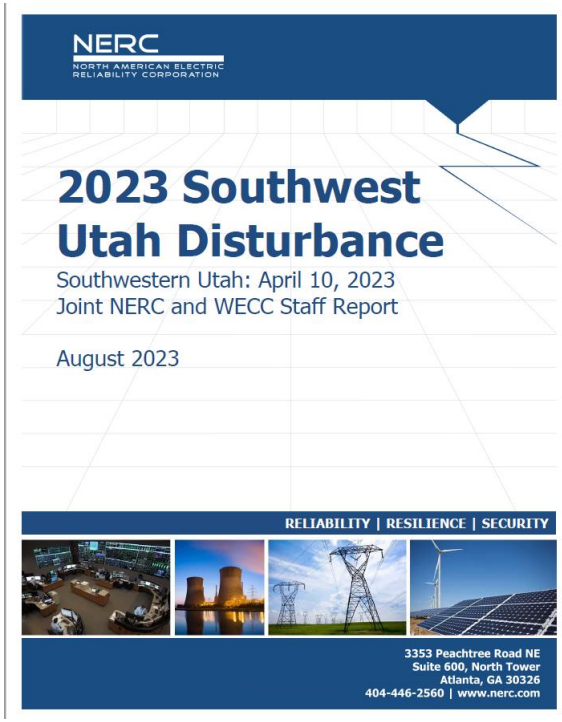
- **Conducting interregional meetings**

- **3rd Quarter Meeting September 21st - Teams**
  - **Preliminary Economic Study results presentation**
    - **MISO to TVA – 2900 MW, 2028W**
    - **South GA to North GA – 1600 MW, 2028S**
    - **TVA to North GA – 1600 MW, 2028S**
    - **MISO to LGE/KU - 1242 MW, 2028S**
    - **SOCO to DEC – 500 MW, 2033**

http://www.southeasternrtp.com/

NERC

NERC
Southwest Disturbance Report



NERC Southwest Disturbance Report

Figure I.2: PACE BPS-Connected Solar PV during Disturbance

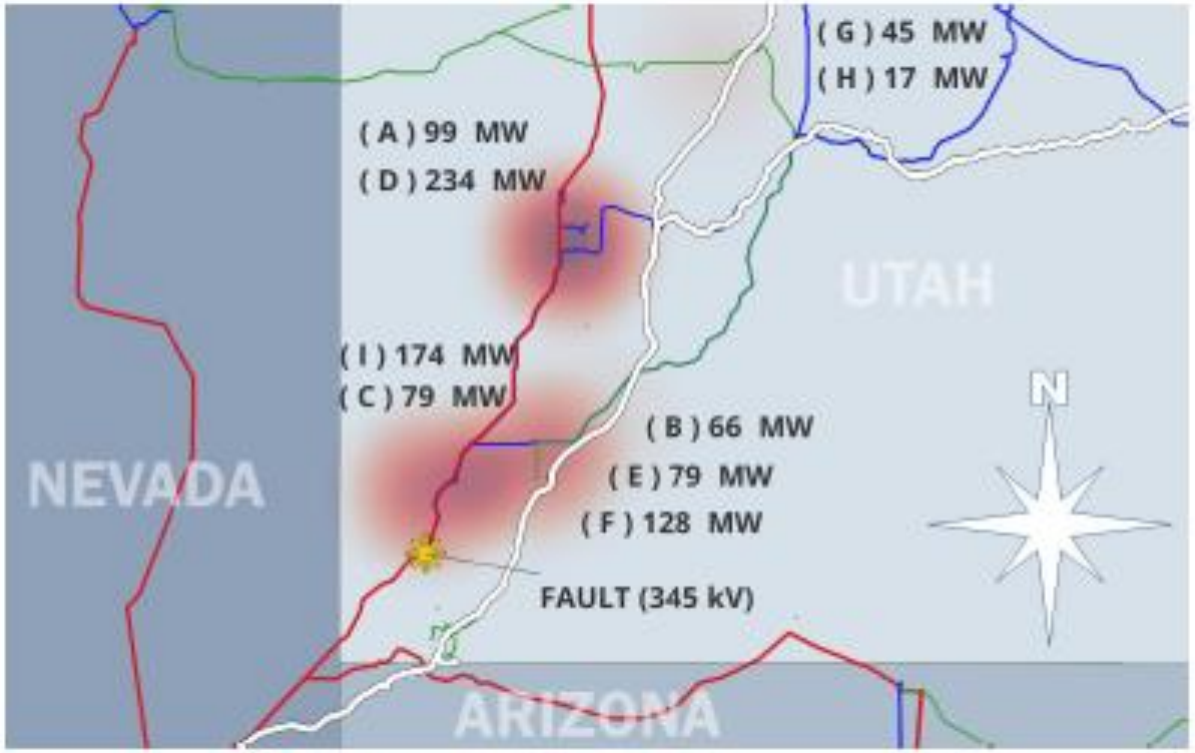


Figure I.3: Map of Fault Location and Affected Solar PV Facilities

NERC Southwest Disturbance Report

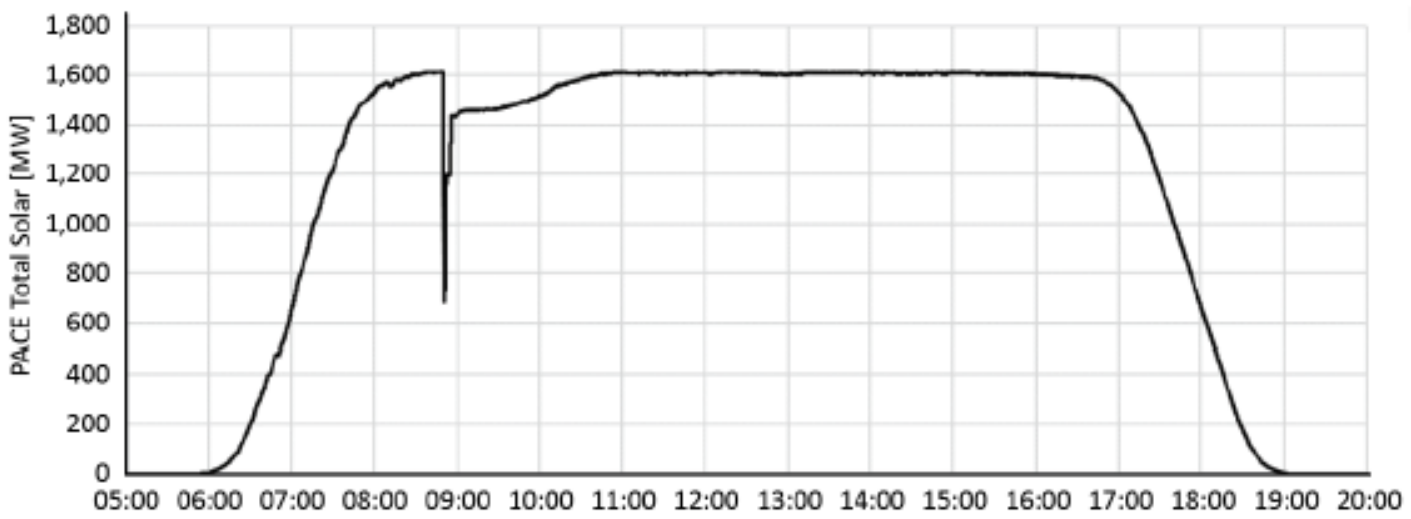


Figure I.1: PACE Solar PV Profile for April 10, 2023

Table I.1: Predisturbance Resource Mix

BPS Operating Characteristic	MW	%*
Internal Net Demand	5,636	-
Exports	477	-
Solar PV Output	1,615	26.4%
Wind Output	1,914	31.3%
Synchronous Generation	2,577	42.3%

* % of internal net demand plus exports

NERC Southwest Disturbance Report

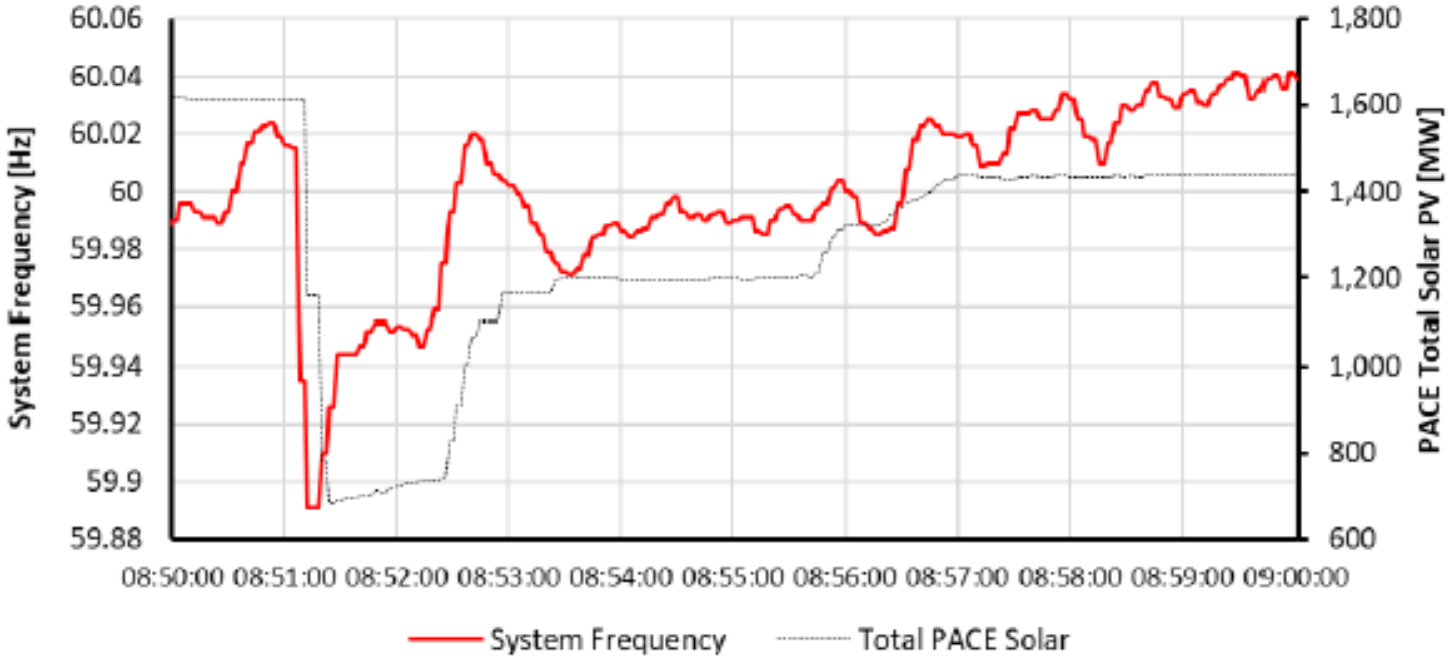


Figure I.4: WECC System Frequency

NERC Southwest Disturbance Report

Table 1.1: Causes of Solar PV Abnormal Performance								
Plant	Loss	OEM	Passive Anti-Islanding	ACOC[11]	PLL Loss of Sync	ACOV[12]	DC Reverse Current	Unknown
A	99	TMEIC		X				
B	66	AE[13]						X
C	79	TMEIC			X	X	X	
D	234	TMEIC			X	X	X	
E	79	TMEIC			X	X		
F	128	TMEIC			X	X		
G	45	TMEIC						X
H	17	TMEIC			X			
I	174	Sungrow	X	X				

NERC Southwest Disturbance Report

Reiterated Need for NERC Project 2023-02 to Ensure Proactive Risk Mitigation:

This report, along with past reports, illustrates and reiterates the strong need for inverter-based resource performance issues to be addressed by Generator Owners (GOs) in a timely manner. GOs are often not addressing performance issues that latently exist within the existing fleet. All of the causes of abnormal performance in this event have been previously documented by NERC in past reports.

NERC Southwest Disturbance Report

Reiterated Need for Performance-Based Comprehensive Ride-Through Standard:

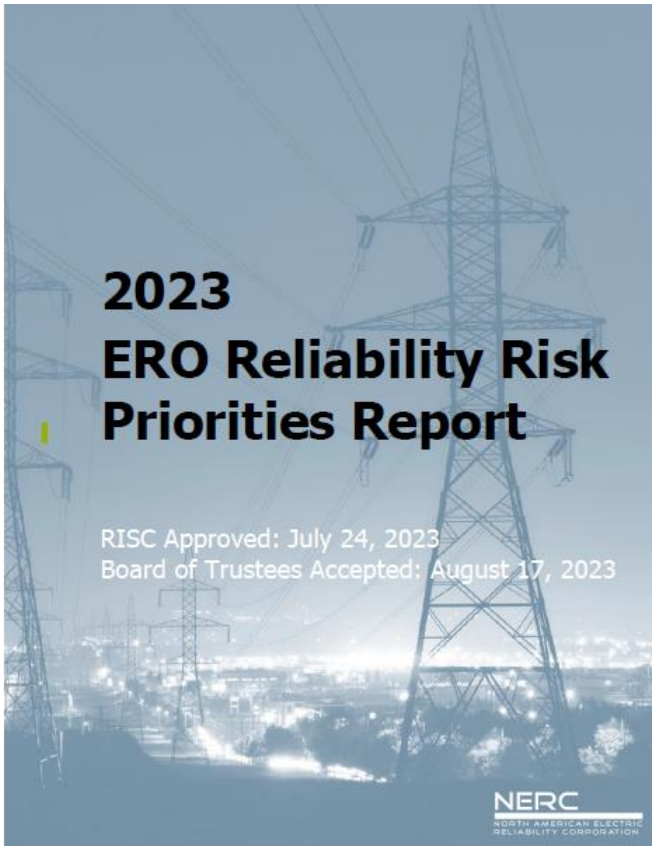
This report, along with past reports, further emphasizes the need for a comprehensive ride-through standard in lieu of NERC PRC-024-3. Project 2020-027 is currently addressing this risk issue by replacing PRC-024-3 "with a performance-based ride-through standard that ensures generators remain connected to the BPS during system disturbances."

NERC Southwest Disturbance Report

Reiterated Need for Level 2 NERC Alert Regarding Inverter-Based Resource Performance Issues:

This event illustrates that equipment installed in the field for many years have latent performance issues that are not identified until certain grid conditions and disturbances result in a widespread resource loss event. NERC issued a Level 2 alert to industry to share key findings and recommendations regarding solar PV performance issues as well as to gather information regarding extent of condition of risk. The data submission deadline was extended to July 31, 2023

NERC
Reliability Risk Priorities



NERC Reliability Risk Priorities

Introduction

This *2023 RISC Report* primary objectives are to identify key risks to the BPS that merit attention and to recommend mitigating actions that align with those risks; it differs from other NERC reports in that it provides industry with strategic direction to plan for imminent risks and their mitigation. This is in contrast to the State of Reliability report or event analysis reports that review data from previous years or events to draw objective conclusions about events, emerging risks, and the appropriate monitoring for their mitigation. This report compliments NERC's Long-Term Reliability Assessment, which is a data-driven assessment of potential future scenarios during the next 10 years.

NERC Reliability Risk Priorities

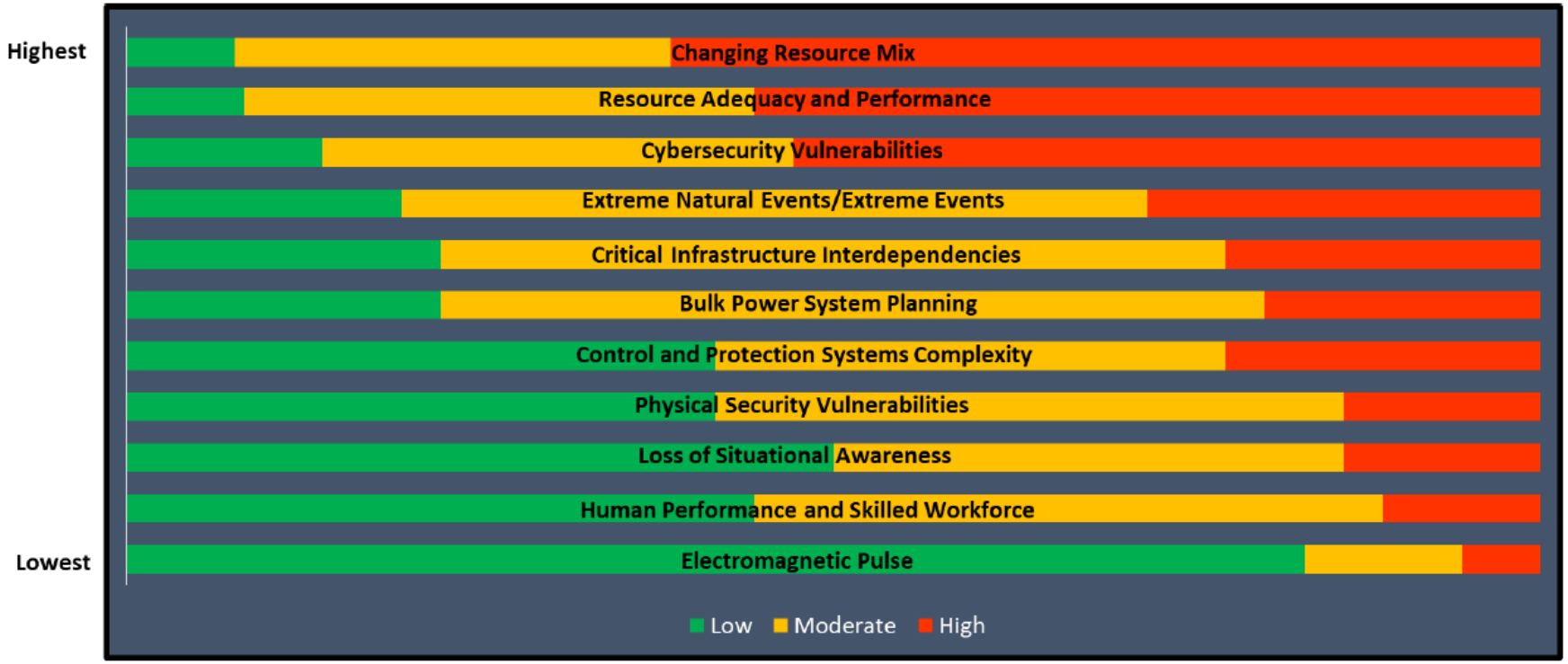


Figure 3: 2023 Risk Ranking

NERC Reliability Risk Priorities

Risk Profiles

The five risk profile sections of this report each provide a statement, descriptors, and recommendations for mitigating each risk type:

1. Risk Profile #1: Energy Policy
2. Risk Profile #2: Grid Transformation
3. Risk Profile #3: Resilience to Extreme Events
4. Risk Profile #4: Security Risks
5. Risk Profile #5: Critical Infrastructure Interdependencies

NERC
Transmission Planning Scenarios

Introduction

The *2023 ERO Reliability Risk Priorities Report*[1] defines and prioritizes risks to the reliable performance of the bulk power system (BPS). The report highlighted the need to consider three transmission planning energy-related scenarios to mitigate risks to the BPS. To address these risks, the NERC Board of Trustees (during its November 16, 2022, meeting[2] and as part of 2023 work plan priorities) directed NERC to have the Standards Committee accept/authorize a standard authorization request (SAR). Additionally, increasing complex cyber attacks highlight the need to intensify the resilience of our essential infrastructure against possible catastrophic effects on the BPS. The inclusion of *cyber-informed transmission planning* that incorporates mitigating cyber security risks into transmission planning energy scenarios is included as a result of the NERC and Regional Entity white paper[3] on this topic. The objective is to modify the TPL-001-5.1[4] NERC Reliability Standard and/or create one or more new Reliability Standards focused on transmission planning analyses that apply energy-related scenarios that consider the following at minimum:

- Normal and extreme natural events[5]
- Natural gas/electricity interdependencies
- Distributed Energy Resource (DER) events
- Cyber-informed transmission planning

NERC Transmission Planning Scenarios

Many of the proposed analyses do require development of corrective action plans – which can include operating guides or infrastructure investments, but in either case require additional analysis work by TP's. There is an expectation to apply cyber informed transmission planning practices – a pretty new concept. The energy scenarios are very broad, have sub-scenarios defined, expect evaluation of normal and extreme events, and sensitivity analysis.

NERC Transmission Planning Scenarios

This work would likely rely on a lot of support from SME's from other disciplines in the development of the models for these scenarios:

- **De-carbonization and Policy Scenario**
- **High Renewables Penetration Scenario**
- **High Demand Scenario**
- **Technology-Driven Scenario**
- **Geographic Scenario**
- **Control and Communication Scenario**
- **Loss of Output Scenario**

NERC Transmission Planning Scenarios

Figure 1: Suggested Suite of Transmission Planning Standards for TPL-001, TPL-007, and Energy Scenarios

Questions ?

2023 TAG Work Plan

Rich Wodyka

Administrator

2023 NCTPC Overview Schedule

Reliability Planning Process

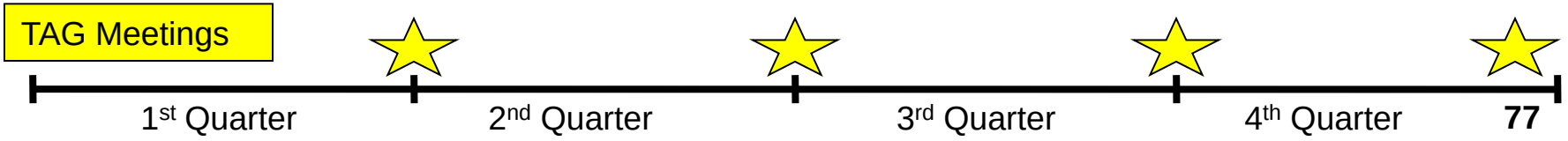
- Evaluate current reliability problems and transmission upgrade plans
- Perform analysis, identify problems, and develop solutions
- Review Reliability Study Results

Local Economic Planning Process

- Propose and select Local Economic Studies and Public Policy Study scenarios
- Perform analysis, identify problems, and develop solutions
- Review Local Economic Study and Public Policy Results

Coordinated Plan Development

- Combine Reliability and Local Economic Study and Public Policy Results
- OSC publishes DRAFT Plan
- TAG review and comment



January - February – March

Fourth Quarter TAG Meeting – January 18, 2023

- **2022 Study Update**
  - ✓ **Received Final DRAFT of 2022 Collaborative Transmission Plan Report**

- **TAG is invited to provide any additional comments or questions to the OSC on the 2022 Collaborative Transmission Plan.**
  - ✓ **Provide input by February 8, 2023 to Rich Wodyka (rich.wodyka@gmail.com)**

January - February – March

➢ 2023 Study – Finalize Study Scope of Work

- ✓ **Received request from OSC to provide input on proposed Local Economic Study scenarios and interfaces for study (Request sent on January 3rd)**
  - ***TAG requested to provide input to the OSC on proposed Local Economic Study scenarios and interfaces for study***
  - **Provide input by February 8, 2023 to Rich Wodyka (rich.wodyka@gmail.com)**
- ✓ **Received request from OSC to provide input in identifying any public policies that are driving the need for local transmission (Request sent on January 3rd)**
  - ***TAG requested to provide input to the OSC in identifying any public policies that are driving the need for local transmission for study***
  - **Provide input by February 8, 2023 to Rich Wodyka (rich.wodyka@gmail.com)**
- ✓ **Received final 2023 Study Scope of Work for review and comment**
  - ***TAG review and provide comments to the OSC on the final 2023 Study Scope of Work***

January - February – March

- ***First Quarter TAG Meeting – March 15, 2023***

- **2023 Study Update**
  - ✓ **Received a progress report on the 2023 Study Activities**
  - ✓ **Received an update on the 2023 Study Scope of Work and any study scenarios that are driving the need for local transmission**

April - May – June

Second Quarter TAG Meeting – June 21, 2023

- ✓ **2023 Study Update**
  - **Received a progress report on 2023 Study Activities**
  - **Received final 2023 Study Scope of Work for review and comment**
- ✓ **Received Mid Year update status of the upgrades in the 2022 Collaborative Plan**
- ✓ **Received a report on the Duke Energy Red-Zone Transmission Expansion Plan Projects (RZEP 2.0)**
- ✓ **Received a progress report on the Transmission Planning Process Attachment N-1 activities**
- ✓ **Received a report on various Regional Studies Activities**
- ✓ **Received an update on the TAG Work Plan**

July - August – September

Third Quarter TAG Meeting – September 14, 2023

- ✓ **2023 Reliability Study Update**
  - **Received a progress report on the 2023 Study Activities and Preliminary Reliability Study Results**
  - ***TAG is requested to provide feedback to the OSC on the technical analysis performed, the problems identified as well as proposing alternative solutions to the reliability problems identified***
    - ❖ **Provide feedback on Preliminary Reliability Study Results by October 16, 2023 to Rich Wodyka (rich.wodyka@gmail.com)**

July - August – September

Third Quarter TAG Meeting – September 14, 2023

- ✓ **Received a report on the Duke Energy Red-Zone Transmission Expansion Plan Projects (RZEP 2.0)**
- ✓ **Received a progress report on the Transmission Planning Process Attachment N-1 activities**
- ✓ **Received a report on various Regional Studies Activities**
- ✓ **Received an update on the TAG Work Plan**

October - November - December

Fourth Quarter TAG Meeting – December 14th

- **2023 Study Update**
  - **TAG will receive feedback from the OSC on any reliability project alternative solutions that were proposed by TAG members**
  - **Receive a report on the 2023 Public Policy Study Results**
  - **Receive and discuss Final DRAFT of the 2023 Collaborative Transmission Plan Report**
- **2024 Study Scope**
  - **Discuss potential Study Scope scenarios for 2024 studies**

Questions ?

TAG
Open Forum Discussion

Comments or Questions ?