TAG Meeting
June 27, 2022

Webinar

Final

TAG Meeting Agenda

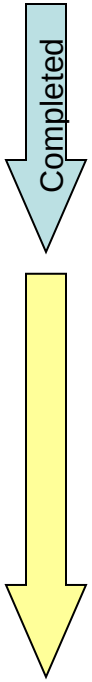
1. Administrative Items – Rich Wodyka
2. 2022 Study Activities and Study Scope Update – Sid DeSouza and Orvane Piper
3. NCTPC 2021 Collaborative Transmission Plan Mid-year Update – Mark Byrd
4. Duke Energy Red-Zone Transmission Expansion Plan Projects – Sammy Roberts
5. Regional Studies Update – Bob Pierce
6. 2022 TAG Work Plan – Rich Wodyka
7. TAG Open Forum – Rich Wodyka

2022 Study Activities and Study Scope

Sid DeSouza - Duke Energy Progress

Orvane Piper – Duke Energy Carolinas

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 Year's for reliability analyses:**
  - **Near-term: 2027 Summer, 2027/2028 Winter**
  - **Longer-term: 2032/2033 Winter**

Assumptions Selected

Company	Generation Facility	2027S	2027/2028W	2032/2033W
DEC	Lincoln County CT (525 MW)	Included	Included	Included
DEC	Apex PV (30 MW)	Included	Included	Included
DEC	Aquadale PV (50 MW)	Included	Included	Included
DEC	Bear Branch PV (35 MW)	Included	Included	Included
DEC	Beaverdam PV (42 MW)	Included	Included	Included
DEC	Blackburn PV (61.7 MW)	Included	Included	Included
DEC	Broad River PV (50 MW)	Included	Included	Included
DEC	Brookcliff PV (50 MW)	Included	Included	Included
DEC	Healing Springs PV (32 MW)	Included	Included	Included
DEC	High Shoals PV (16 MW)	Included	Included	Included

Assumptions Selected

Company	Generation Facility	2027S	2027/2028W	2032/2033W
DEC	Hornet PV (75 MW)	Included	Included	Included
DEC	Hunters Cove (50 MW)	Included	Included	Included
DEC	Lick Creek PV (50 MW)	Included	Included	Included
DEC	Misenheimer PV (74.4 MW)	Included	Included	Included
DEC	Newberry PV (74.5 MW)	Included	Included	Included
DEC	Oakboro PV (40 MW)	Included	Included	Included
DEC	Olin Creek PV (35 MW)	Included	Included	Included
DEC	Partin PV (50 MW)	Included	Included	Included
DEC	Pelham PV (32 MW)	Included	Included	Included
DEC	Pinson PV (20 MW)	Included	Included	Included

Assumptions Selected

Company	Generation Facility	2027S	2027/2028W	2032/2033W
DEC	Quail PV (30 MW)	Included	Included	Included
DEC	Speedway (22.6 MW)	Included	Included	Included
DEC	Stanly PV (50 MW)	Included	Included	Included
DEC	Stony Knoll PV (22.6 MW)	Included	Included	Included
DEC	Sugar PV (60 MW)	Included	Included	Included
DEC	Two Hearted PV (22 MW)	Included	Included	Included
DEC	West River PV (40 MW)	Included	Included	Included
DEC	Westminster PV (75 MW)	Included	Included	Included

Assumptions Selected

Company	Generation Facility	2027S	2027/2028W	2032/2033W
DEP	Cabin Creek Solar (70.2 MW)	Included	Included	Included
DEP	Gold Valley Solar (78.8 MW)	Included	Included	Included
DEP	Nutbush Solar (35 MW)	Included	Included	Included
DEP	Camp Lejeune Battery (10 MW)	Included	Included	Included
DEP	Sapony Creek (23.4 MW)	Included	Included	Included
DEP	Loftins Crossroads (75 MW)	Included	Included	Included
DEP	Roxboro CC Units 1-2 (2700 MW)	Not Included	Not Included	Included

Assumptions Selected

Company	Generation Facility	2027S	2027/2028W	2032/2033W
DEC	Allen 1-5 (1083 MW)	Retired	Retired	Retired
DEC	Cliffside 5 (574 MW)	Retired	Retired	Retired
DEC	Lee 3 (120 MW)	Retired	Retired	Retired
DEP	Darlington Co 1,2,3,4,6,7,8,10 (514 MW)	Retired	Retired	Retired
DEP	Blewett CTs 1-4 and Weatherspoon CTs 1-4 (232 MW)	Retired	Retired	Retired
DEP	Roxboro Units 1-4 (2462 MW)	Not retired	Not retired	Retired
DEP	Mayo Unit 1 (746 MW)	Not retired	Not retired	Retired

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

- **Annual Reliability Study**
  - **Near-term: 2027 Summer, 2027/2028 Winter**
  - **Longer-term: 2032/2033 Winter**
- **Local Economic Study**
  - **Evaluate a total of 14 hypothetical transfers in 2032/33 Winter**
- **Public Policy Study**
  - **The scope of this study is still being developed at this time**

Resource Supply Options for Hypothetical Transfer Scenarios

ID	Resource From	Sink	Test Level (MW)
1	PJM	DUK	1,000
2	SOCO	DUK	1,000
3	CPLE	DUK	1,000
4	TVA	DUK	1,000
5	PJM	CPLE	1,000
6	DUK	CPLE	1,000
7	DUK	SOCO	1,000
8	PJM	DUK/CPLE	1,000/ 1,000
9	DUK/CPLE	PJM	1,000/ 1,000
10	CPLE	PJM	1,000
11	DUK	PJM	1,000
12	DUK	TVA	1,000
13	DUK	SCPSA	750
14	PJM	SCPSA	500

Technical Analysis

- Conduct thermal screenings of the 2027S, 2027/28W and 2032/33W base cases
- Conduct thermal screenings for transfer scenarios in 2032/33W

Problems Identified and Solutions Developed

- Identify limitations and develop potential alternative solutions for further testing and evaluation
- Estimate project costs and schedule

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 ?

NCTPC 2021 Collaborative Transmission Plan Update

Mark Byrd

Duke Energy Progress

2022 Mid-Year Update to the 2021 Collaborative Transmission Plan

- **One DEP project was completed**
- **Five DEP project cost estimates went up and one went down**
- **Two DEP projects were accelerated**
- **Four DEC projects were delayed**
- **Total Reliability Project Cost estimates changed from $694M to $748M**

Reliability Projects in 2021 Plan		
Reliability Project	**TO**	**Planned I/S Date**
Durham-RTP 230kV Line, Reconductor	**DEP**	**TBD**
Asheboro-Asheboro East 115 kV North Line, Reconductor	**DEP**	**Completed June 2022**
Windmere 100 kV Line, (Dan River-Sadler), Construct	**DEC**	**Delayed June 2024**

Changes from 2021 Plan are shown in Red

Reliability Projects in 2020 Plan (continued)		
Reliability Project	**TO**	**Planned I/S Date**
Wilkes 230/100 kV Tie Station, Construct	**DEC**	**June 2024**
Craggy-Enka 230 kV Line, Construct	**DEP**	**Accelerated December 2024**
Cokesbury 100 kV Line (Coronaca-Hodges), Upgrade	**DEC**	**Delayed June 2026**
South Point Switching Station, Construct	**DEC**	**Delayed December 2025**

Changes from 2021 Plan are shown in Red

Reliability Projects in 2020 Plan (continued)		
Reliability Project	**TO**	**Planned I/S Date**
Wateree 115 kV Plant, Upgrade 115/100 kV Transformers	**DEP**	**Accelerated July 2023**
Carthage 230/115 kV Substation, Construct Sub	**DEP**	**December 2025**
Falls 230 kV Sub, Add 300 MVAR SVC	**DEP**	**December 2028**
Castle Hayne–Folkstone 115 kV Line, Rebuild	**DEP**	**December 2026**
Holly Ridge North 115 kV Switching Station, Construct	**DEP**	**December 2026**

Changes from 2021 Plan are shown in Red

Reliability Projects in 2020 Plan (continued)		
Reliability Project	**TO**	**Planned I/S Date**
Coronaca 100 kV Line (Coronaca-Creto), Upgrade and Add Second Circuit	**DEC**	**Delayed December 2029**
Monroe 100 kV Line (Lancaster-Monroe), Upgrade	**DEC**	**June 2027**
Westport 230 kV Line (McGuire-Marshall), Upgrade	**DEC**	**TBD**

Changes from 2021 Plan are shown in Red

Proposed Updates to the Collaborative Plan at Mid-Year

- Eighteen (18) new Red Zone Transmission Expansion Plan projects are proposed to be added to the Collaborative Plan at mid-year.
- The justification for these projects is based on the need to reduce transmission system constraints impacting Duke Energy's ability to connect renewable generation, ensure system reliability, and achieve public policy
- These projects have been identified as constraints in prior generation interconnection studies

Red Zone Projects Proposed to be Added		
Project	**TO**	**Planned I/S Date**
Lee 100 kV (Lee-Shady Grove), Upgrade	**DEC**	**December 2026**
Piedmont 100 kV (Lee-Shady Grove), Upgrade	**DEC**	**December 2026**
Newberry 115 kV (Bush River-DESC), Upgrade	**DEC**	**December 2026**
Clinton 100 kV (Bush River-Laurens), Upgrade	**DEC**	**December 2026**

Red Zone Projects Proposed to be Added (continued)		
Project	**TO**	**Planned I/S Date**
Cape Fear Plant – West End 230 kV Line, Upgrade	**DEP**	**September 2026**
Erwin – Fayetteville East 230 kV Line, Upgrade	**DEP**	**September 2026**
Erwin – Fayetteville 115 kV Line, Upgrade	**DEP**	**September 2026**
Rockingham – West End 230 kV West Line, Upgrade	**DEP**	**September 2026**

Red Zone Projects Proposed to be Added (continued)		
Project	**TO**	**Planned I/S Date**
Fayetteville-Fayetteville Dupont 115 kV Line – 3.2 miles section, Upgrade *	**DEP**	**September 2026**
Milburnie 230 kV Substation, Add redundant bus protection	**DEP**	**September 2026**
Erwin-Milburnie 230 kV Line, Upgrade	**DEP**	**December 2026**
Sutton Plant-Wallace 230 kV Line, Upgrade	**DEP**	**December 2026**

*This project is also required in the most recent NERC TPL reliability studies

Red Zone Projects Proposed to be Added (continued)		
Project	**TO**	**Planned I/S Date**
Weatherspoon-Marion 115 kV Line, Upgrade	**DEP**	**December 2026**
Camden-Camden Dupont 115 kV Line, Upgrade	**DEP**	**December 2026**
Camden Junction-DPC Wateree 115 kV Line, Upgrade	**DEP**	**December 2026**
Robinson Plant-Rockingham 115 kV Line, Upgrade	**DEP**	**December 2026**

Red Zone Projects Proposed to be Added (continued)		
Project	**TO**	**Planned I/S Date**
Robinson Plant-Rockingham 230 kV Line, Upgrade	**DEP**	**December 2026**
Fayetteville-Fayetteville Dupont 115 kV Line – 4.9 miles section, Upgrade	**DEP**	**December 2026**

Review Study Mapping Spreadsheet

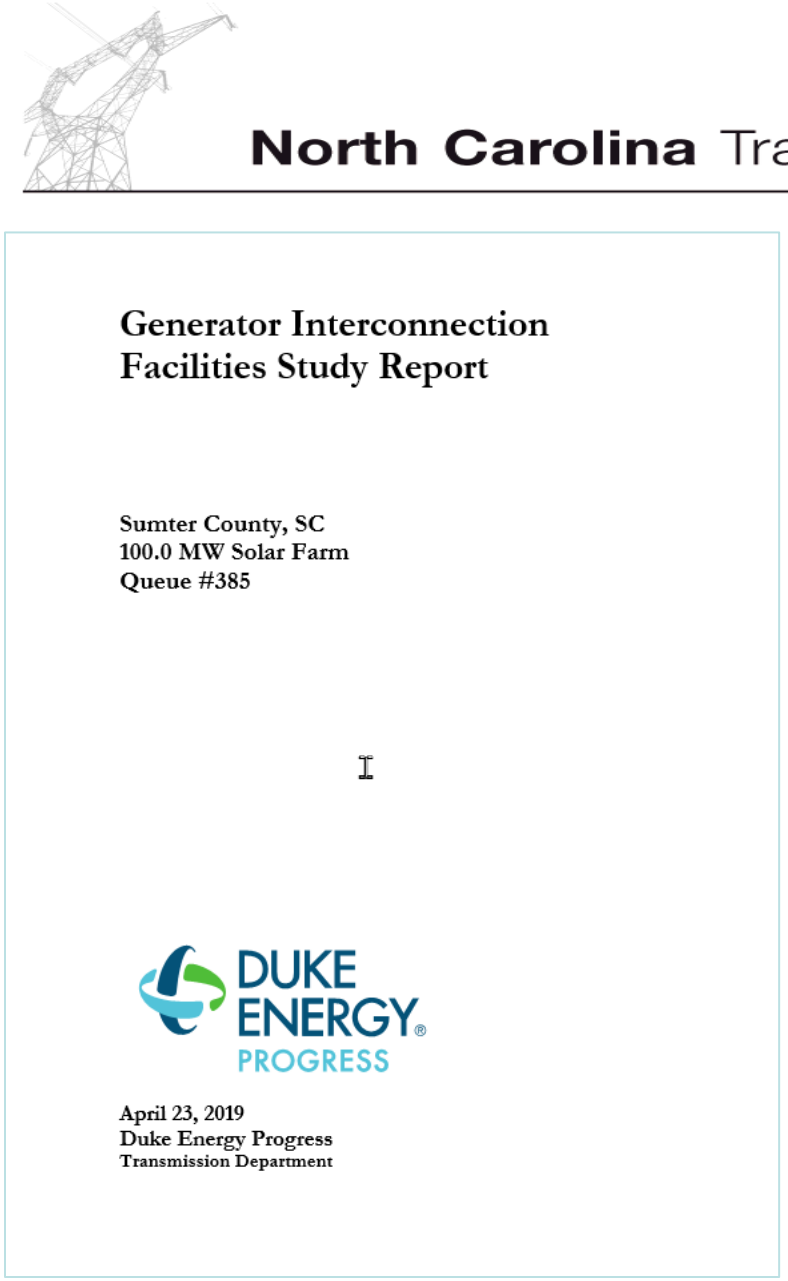
- Mapping of 79 interconnection studies to the 18 Red Zone Transmission Expansion Plan Projects
- All 79 Requests shown were assigned Network Upgrades and subsequently Withdrew from the Queue
- Studies were performed from 2017 through 2022
- Example study for DEP Q385 (1 of 79 studies)

Review Study Mapping Spreadsheet

Refer to Separate Spreadsheet

Provided for Mapping of Queue

Request Studies to Proactive Projects


Generator Interconnection
Facilities Study Report

Sumter County, SC
100.0 MW Solar Farm
Queue #385

DUKE ENERGY PROGRESS

April 23, 2019
Duke Energy Progress
Transmission Department

Example study for DEP Q385

- 100 MW Solar Generator
- Requested Interconnection to the Robinson Plant-Sumter 230kV Line
- Assigned 1 Red Zone Project
- Contingent on 5 additional Red Zone Projects (Friesian Projects)

All relevant contingency categories from NERC Standard TPL-001-4 have been analyzed in this study. Contingency analysis study results show that interconnection of these generation facilities **DOES** result in potential thermal overloads on the DEP system. The following facilities will need to be upgraded to accommodate the proposed generation:

Table 2: Network Upgrades Assigned to This Request

Facility	Sections	Length (mi)	Upgrade	Cost Estimate ($)	Time To Complete (years)
Fayetteville – Fayetteville DuPont SS 115 kV Line	Hope Mills Church St – Fayetteville	4.9	Reconductor to 3-1590 ACSR	9,531,580	5

The results in this study are dependent on assumptions regarding prior-queued interconnection requests and transmission plans. In particular, this request is Contingent upon the network upgrades described in Table 3 for prior-queued requests and Table 4 from the utility transmission plan. If any prior-queued requests drop out of the queue or other assumptions change, these study results **may change significantly**.

Table 3: Contingent Network Upgrades Assigned to Prior Requests

Assignee	Facility	Sections	Length (mi)	Upgrade	Cost Estimate ($M)	Time To Complete (years)
Q380	Erwin - Fayetteville East 230kV line	All	23	Reconductor to 6-1590 ACSR	83.5	4
Q380	Fayetteville - Fayetteville DuPont SS 115kV line	Hope Mills Ch. St. – Roslin Solar	3	Reconductor to 3-1590 ACSR	8.4	3
Q380	Cape Fear - West End 230kV line	West End – Center Ch. – Sanford Garden St – Sanford US1	26	Reconductor to 6-1590 ACSR	89.7	4
Q380	Erwin - Fayetteville 115kV line	Fay Slocomb Tap – Beard - Wade	9	Reconductor to 3-1590 ACSR	27.2	3

Rockingham-West End 230 kV Line from Q380 study was also a Contingent Upgrade for Q385

Generator Interconnection Facilities Study Report:
Scotland County, NC – 75.0 MW, Queue #380

3 RESULTS

3.1 Power-flow Analysis Results

Facilities that may require upgrade within the first three to five years following the in-service date are identified. Based on projected load growth on the DEP transmission system, facilities of concern are those with post-contingency loadings of 95% or greater of their thermal rating and low voltage of 92% and below, for the requested in-service year or the in-service year of a higher queued request. The identification of these facilities is crucial due to the construction lead times necessary for certain system upgrades. This process will ensure that appropriate focus is given to these problem areas to investigate whether construction of upgrade projects is achievable to accommodate the requested interconnection service.

All queue requests, as well as nearby existing and prior-queued generation, were modeled and assumed to be operating at full output.

Contingency analysis study results show that interconnection of these generation facilities **DOES** result in potential thermal overloads on the DEP system. The following facilities will need to be upgraded to accommodate the proposed generation:

Table 2: Network Upgrades

Facility	Sections	Length (mi)	Upgrade	Cost Estimate ($M)	Time To Complete (years)
Erwin - Fayetteville East 230 kV line	All	23	Reconductor to 6-1590 ACSR	40.8	4
Fayetteville – Fay. DuPont SS 115kV line	Hope Mills Church St. – Roslin Solar	3	Reconductor to 3-1590 ACSR	4.5	3
Cape Fear - West End 230 kV line	West End – Center Ch. – Sanford Garden St - Sanford US 1	26	Reconductor to 6-1590 ACSR	52.0	4
Cape Fear - West End 230 kV line	Sanford Deep River Tap Point – Sanford Horner Blvd.	4.4	Upgrade to full conductor rating	1.0	2
Erwin - Fayetteville 115kV line	Fay Slocomb Tap – Beard - Wade	9	Reconductor to 3-1590 ACSR	13.5	3
Rockingham – West End 230kV Line	Eden Solar Sw. St. - West End	7.7	Upgrade to full conductor rating	0.5	2
Total				**112.3**	**4**

These results are dependent on assumptions regarding prior-queued interconnection requests. If any prior-queued requests drop out of the queue, these results may change.

- **5 Q380 Red Zone Projects (Friesian Projects)**

Red-Zone Transmission Expansion Plan Projects

TAG Meeting





JUNE 27, 2022

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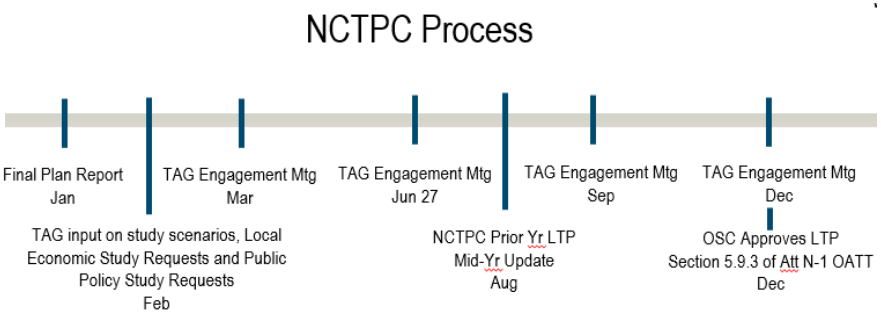
NCTPC Schedule / TAG Engagement Meeting

- Following Local Transmission Planning Process as defined in Attachment N-1 of Joint OATT and effectuated by the NCTPC
- Presented RZEP projects as generator interconnection study informed and described need for projects to OSC in March
- Shared initial mapping of queue request studies to RZEP projects with OSC in April
- Provided updated information on number of generator interconnection studies reflecting RZEP upgrades needed for interconnection to OSC, PWG in June
- NCTPC included RZEP projects in draft 2021 Plan Mid-year Update Report distributed to TAG and posted on NCTPC website for input from stakeholders
- Presenting the draft 2021 Plan Mid-year Update Report with the RZEP projects included at the June 27 TAG meeting
- Soliciting TAG feedback/input during the TAG meeting as well as a period after the TAG meeting
- Current plan is for OSC to consider TAG input and decide on approval of draft 2021 Plan Mid-year Update Report by mid-August



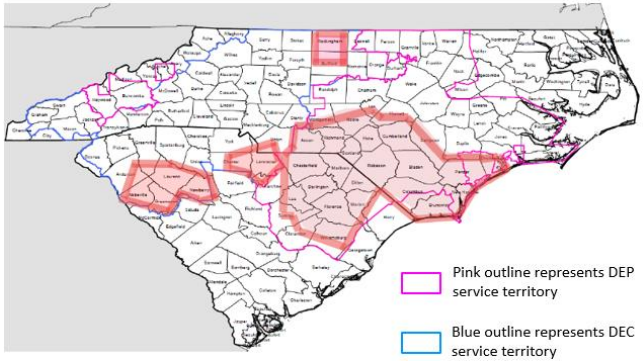
Red-Zone Constraints Resolved Only Through Network Upgrades

- Only queue informed RZEP upgrades will start to unlock the red-zone for additional solar to interconnect
- Even though this red-zone guidance has been provided since CPRE began, developers still request interconnections in the red-zone due to:
  - Lower land lease rates
  - Availability of larger land parcels
  - NREL GHI Map shows slightly better irradiance

Attachment 1

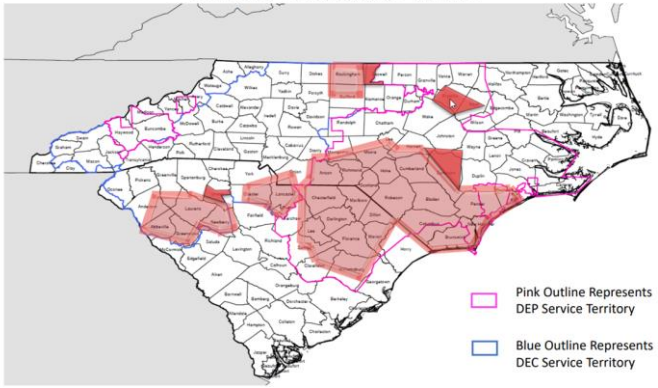
DEC and DEP Constrained Areas

5-9-2018



DEC and DEP Constrained Areas – Tranche 2

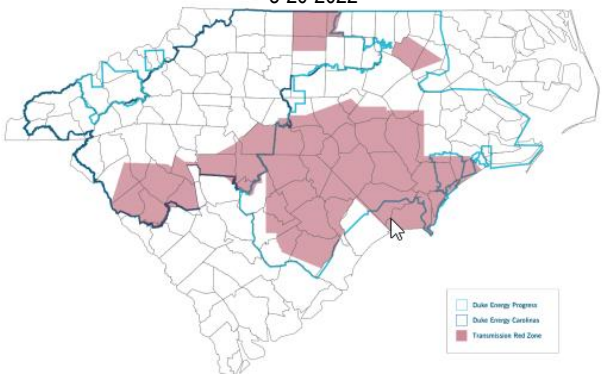
8-5-2019



Attachment 1

DEC/DEP Transmission "Red Zone" Map

5-20-2022

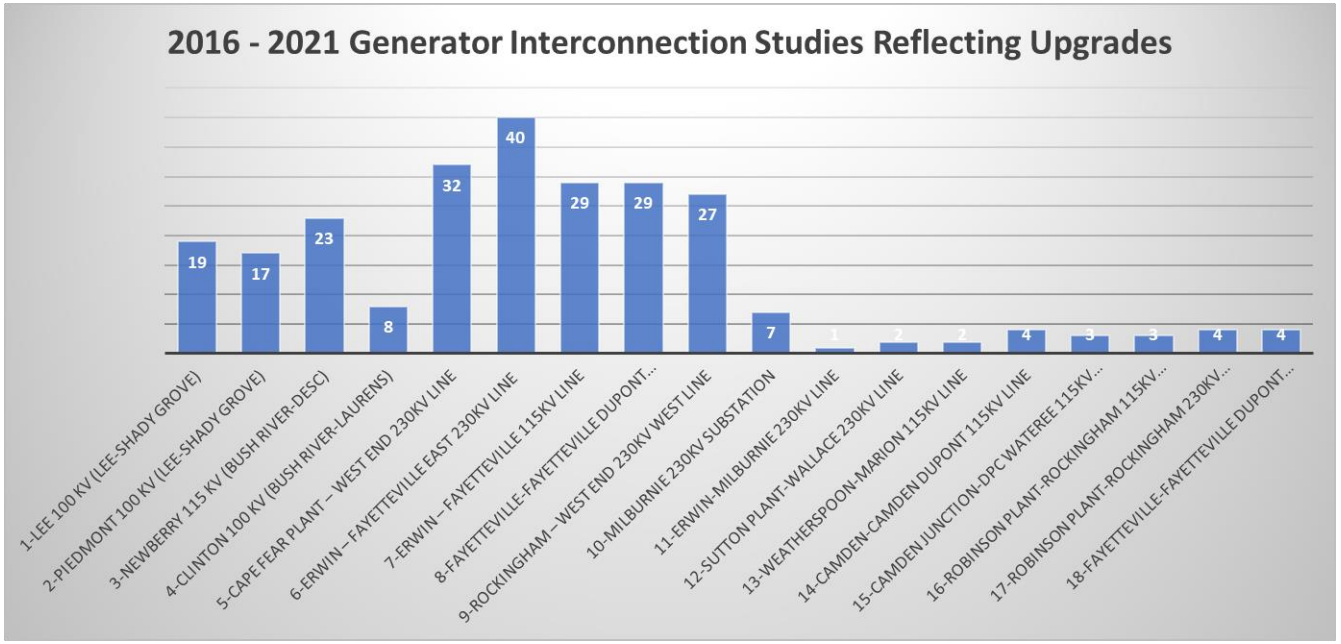


RZEP Projects are Generator Interconnection Study Informed

In accordance with the OATT, Attachment N-1 Section 4.1, the RZEP projects are needed to integrate new generation resources to meet Carbon Plan objectives

DEC
- Projects 1 – 4 are in DEC and the estimated cost is $241M
- Projects 1 – 4 have historical generator interconnection studies (excl. TCS) representing 1500+ MW of solar resources

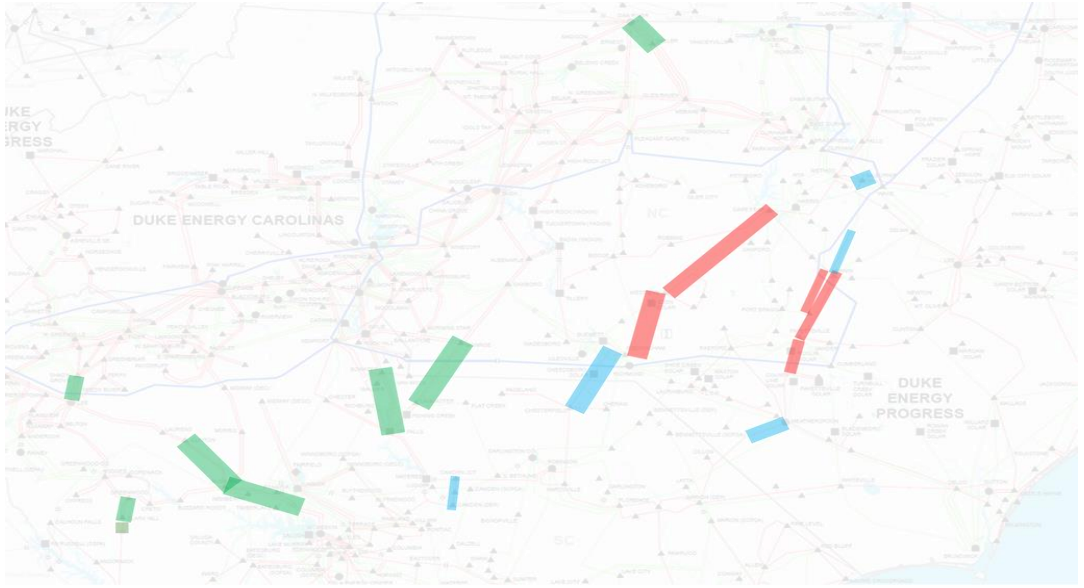
DEP
- Projects 5 – 18 are in DEP and the estimated cost is $319.6M
- Projects 5 – 18 have historical generator interconnection studies (excl. TCS) representing 3700+ MW of solar resources



Past generator interconnection requests show RZEP are needed to integrate new generation resources, as well as supporting HB951 objectives *(at least 5400MW of new solar interconnected between 2026 – 2029 to achieve 70% by 2030)*

RZEP Projects are Not a New Concept

- Red Zone constraints have been major cause of interconnection disputes since 2019
- Highlighted need for proactive transmission planning during the Oct. 6, 2021 NCUC Technical Conference in Docket No. E-100, Sub 165 (2020 IRP Docket)



Solar in 2020 IRPs

- Aggressive volumes of additional solar to achieve material CO2 reduction were identified in the 2020 IRP portfolios
- 8 – 12 GW of additional solar identified in Portfolios B through F for meaningful CO2 reductions
- The solar transmission network upgrade proxy used for interconnecting new solar has been progressively increasing as well as past resource plans showing increasing solar needs

	DEC $/W	DEP $/W
2020 Used in 2020 IRP	0.1672	0.1168
2021 IRP Update	0.1913	0.1470
2022 Current RZEP based	0.2358	0.1705

DUKE ENERGY CAROLINAS

DEC / DEP COMBINED SYSTEM PORTFOLIO RESULTS TABLE

PORTFOLIO	A: Base without Carbon Policy	B: Base with Carbon Policy	C: Earliest Practicable Coal Retirements	D: 70% CO_2 Reduction: High Wind	E: 70% CO_2 Reduction: High SMR	F: No New Gas Generation
System CO_2 Reduction (2030 | 2035)[1]	56% | 53%	59% | 62%	64% | 64%	70% | 73%	71% | 74%	65% | 73%
Present Value Revenue Requirement (PVRR) [$B][2]	$79.8	$82.5	$84.1	$100.5	$95.5	$108.1
Estimated Transmission Investment Required [$B][3]	$0.9	$1.8	$1.3	$7.5	$3.1	$8.9
Total Solar [MW][4, 5] by 2035	8,650	12,300	12,400	16,250	16,250	16,400
Incremental Onshore Wind [MW][4] by 2035	0	750	1,350	2,850	2,850	3,150
Incremental Offshore Wind [MW][4] by 2035	0	0	0	2,650	250	2,650
Incremental SMR Capacity [MW][4] by 2035	0	0	0	0	1,350	700
Incremental Storage [MW][4, 6] by 2035	1,050	2,200	2,200	4,400	4,400	7,400
Incremental Gas [MW][4] by 2035	9,600	7,350	9,600	6,400	6,100	0
Total Contribution from Energy Efficiency and Demand Response Initiatives [MW][7] by 2035	2,050	2,050	2,050	3,350	3,350	3,350
Remaining Dual Fuel Coal Capacity [MW][4, 8] by 2035	3,050	3,050	0	0	0	2,200
Coal Retirements	Most Economic	Most Economic	Earliest Practicable	Earliest Practicable[9]	Earliest Practicable[9]	Most Economic[10]
Dependency on Technology & Policy Advancement	○	◔	◐	◕	●	●

Solar in Carbon Plan filed on May 16, 2022

Portfolio 1 – 70% CO2 Reduction by 2030

- 5.4 GW of additional new solar by 2030
  - Assumes 6800 MWac connected by 2025
- Up to an additional 11.9 GW of new solar by 2035

- Table I-2 from Appendix I of the Carbon Plan shows aggressive solar interconnection to meet 70% by 2030

Table I-2: Maximum Solar (MW) Allowed to Connect Annually (by Jan. 1 of year shown)

Beginning of Year	2027	2028	2029	2030+
70% by 2034 with Wind or Nuclear	750	1,050	1,350	1,350
70% by 2030	750	1,050	1,800	1,800

Figure 3-1: Portfolio Snapshot to Achieve 70% Interim Target (2030-2034)

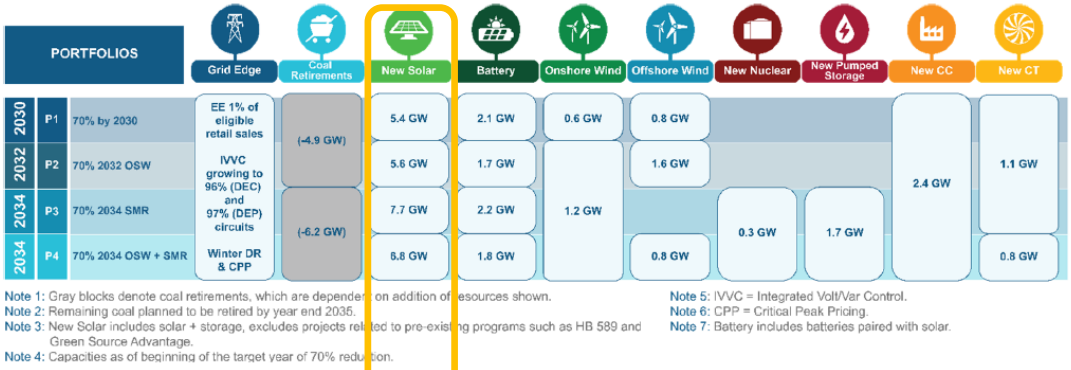
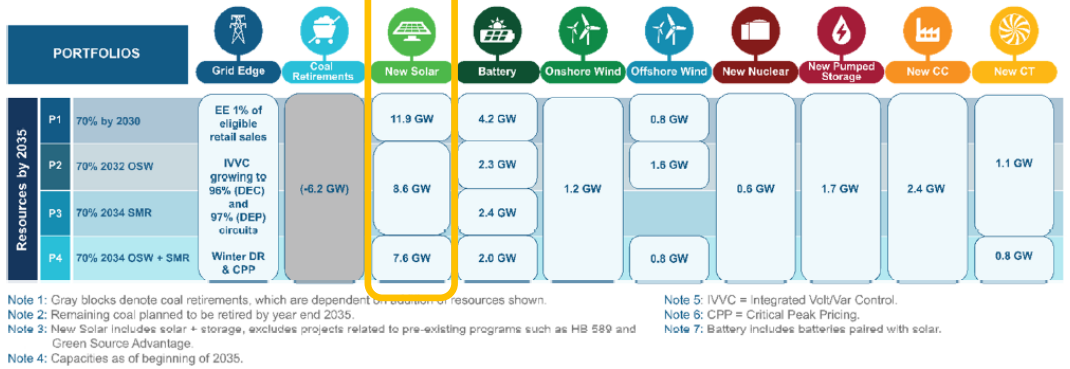
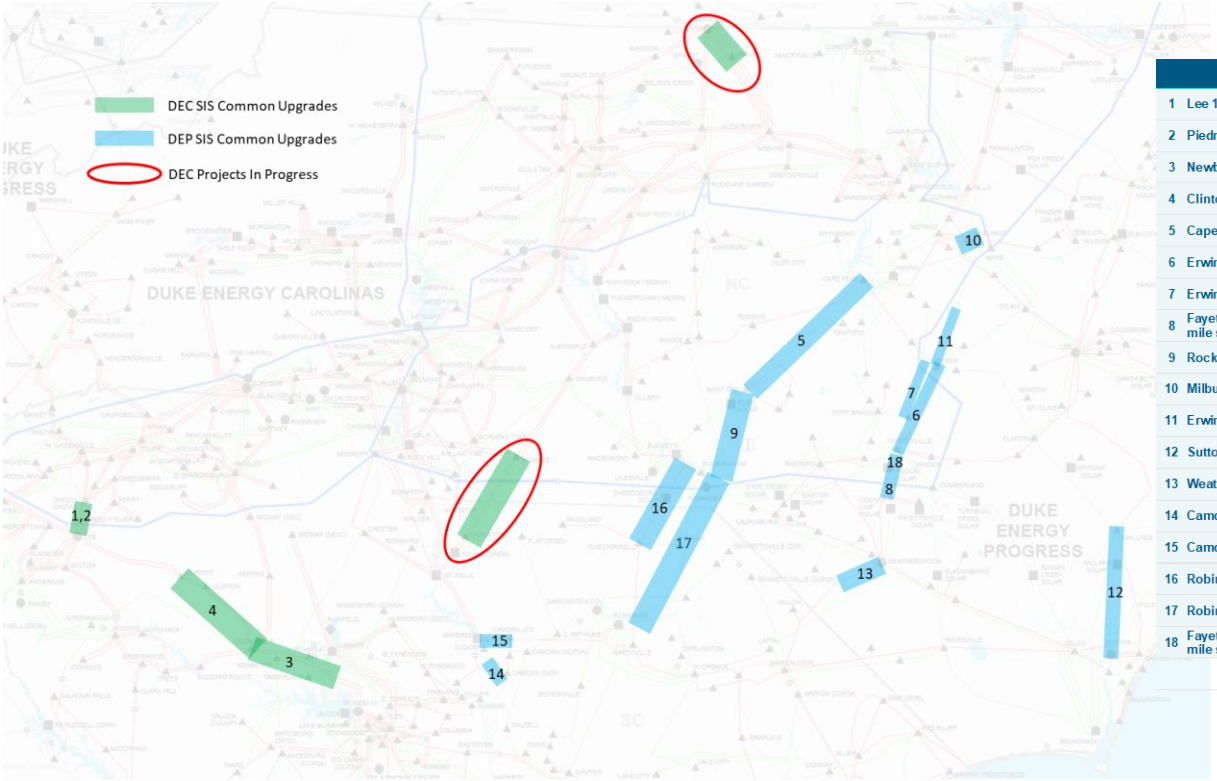


Figure 3-2: Portfolio Snapshot in 2035



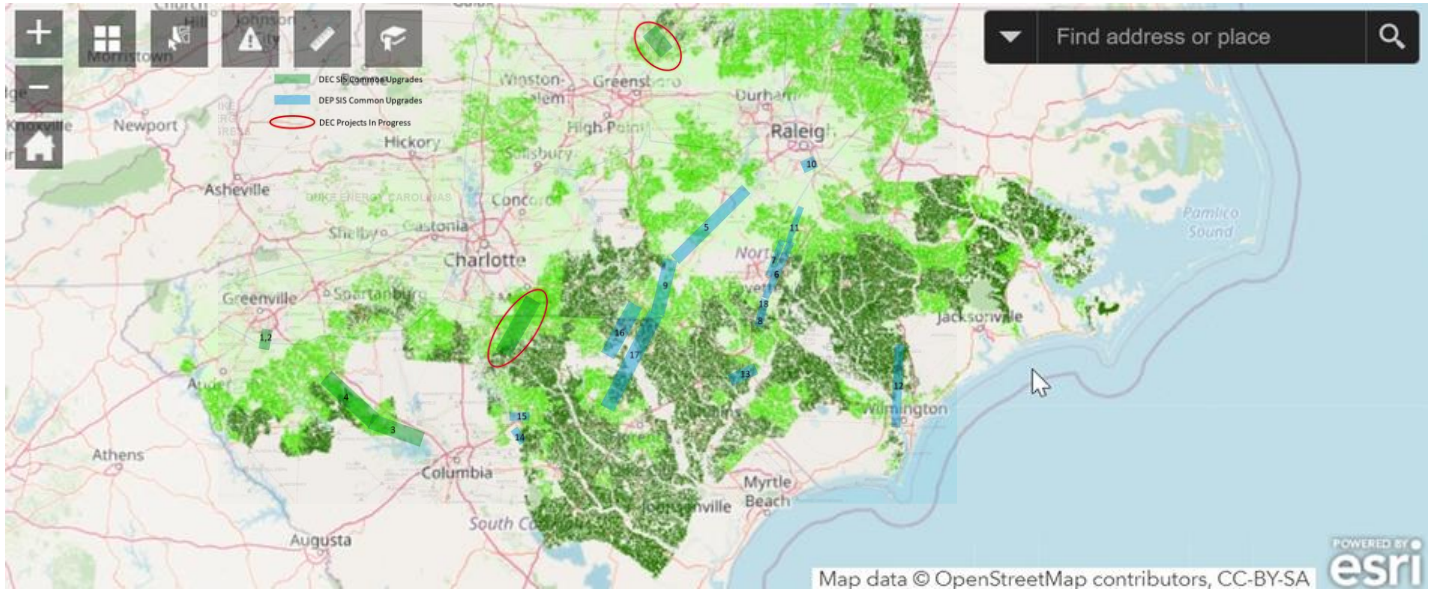
DEC and DEP Red Zone Transmission Expansion Plan



	Project	Owner	Project Description	Total Cost (FB, w/ contingency)	Estimate Class
1	Lee 100 kV (Lee-Shady Grove)	DEC	Upgrade	$45,000,000	5
2	Piedmont 100 kV (Lee-Shady Grove)	DEC	Upgrade	$45,000,000	5
3	Newberry 115 kV (Bush River-DESC)	DEC	Upgrade	$42,000,000	5
4	Clinton 100 kV (Bush River-Laurens)	DEC	Upgrade	$109,000,000	5
5	Cape Fear Plant – West End 230kV Line	DEP	Rebuild	$70,349,010	4
6	Erwin – Fayetteville East 230kV Line	DEP	Rebuild	$83,933,750	4
7	Erwin – Fayetteville 115kV Line	DEP	Rebuild	$21,288,975	4
8	Fayetteville-Fayetteville Dupont 115kV Line – 3.2 mile section	DEP	Rebuild	$14,106,625	4
9	Rockingham – West End 230kV West Line	DEP	Upgrade	$1,457,875	4
10	Milburnie 230kV Substation	DEP	Redundant Bus Protection	$4,324,127	4
11	Erwin-Milburnie 230kV Line	DEP	Rebuild	$5,300,000	5
12	Sutton Plant-Wallace 230kV Line	DEP	Upgrade	$500,000	5
13	Weatherspoon-Marion 115kV Line	DEP	Rebuild	$13,000,000	5
14	Camden-Camden Dupont 115kV Line	DEP	Rebuild	$2,600,000	5
15	Camden Junction-DPC Wateree 115kV Line	DEP	Rebuild	$10,000,000	5
16	Robinson Plant-Rockingham 115kV Line	DEP	Rebuild	$38,000,000	5
17	Robinson Plant-Rockingham 230kV Line	DEP	Rebuild	$43,100,000	5
18	Fayetteville-Fayetteville Dupont 115kV Line – 4.9 mile section	DEP	Rebuild	$11,600,000	5
			Total	$560,560,362	

Solar Viability Map Reflects RZEP Need

- Using the ESRI Mapping Application
- This Map reflects:
  - NREL provided exclusion areas based on wetlands, national and state parks, federal lands
  - Solar viability based on population density, forestation, land availability
  - Moderate solar viability (lime green)
  - Maximum solar viability (dark green)



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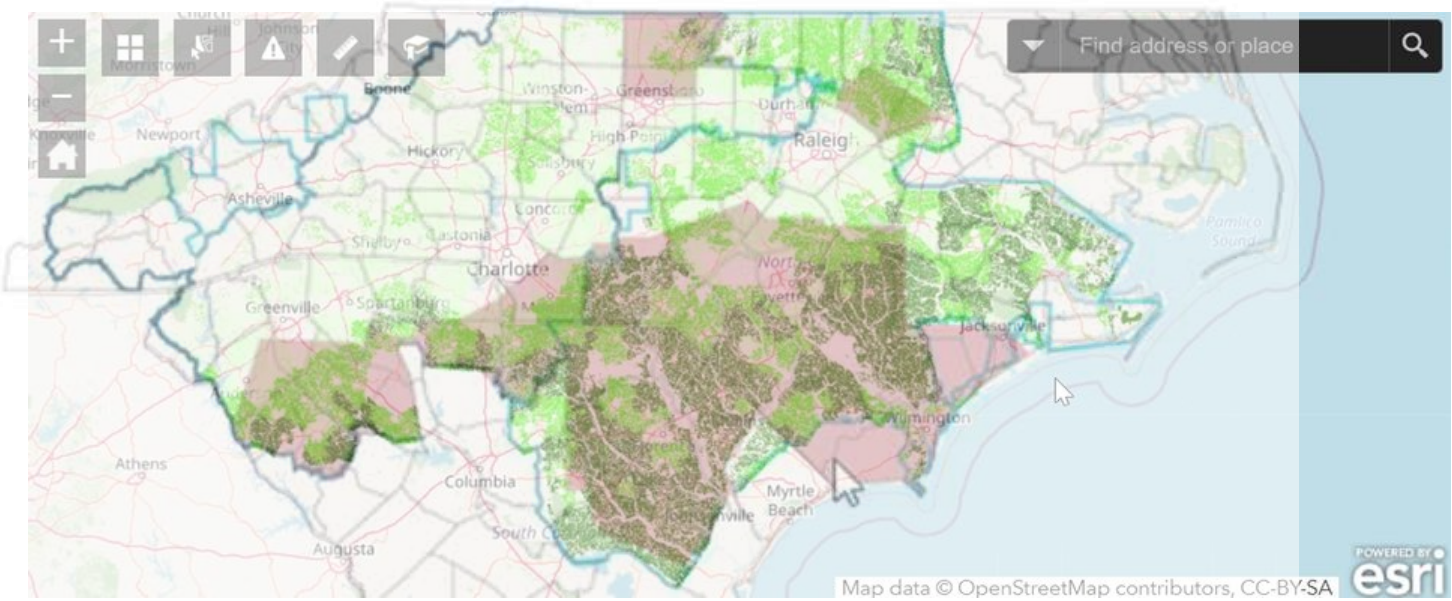
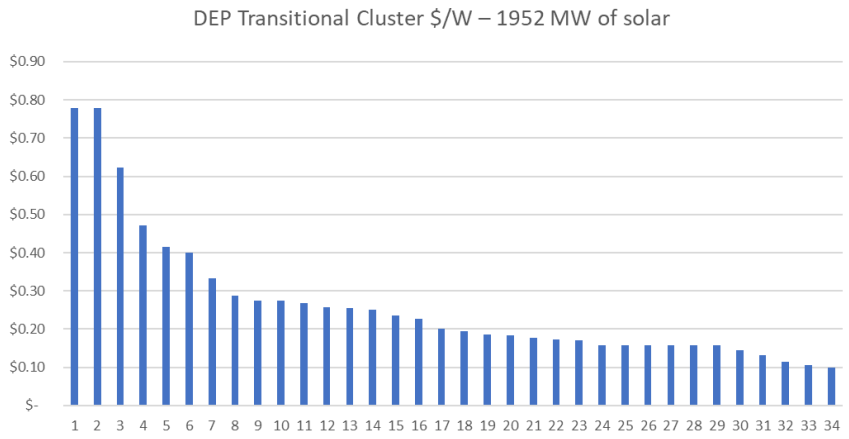
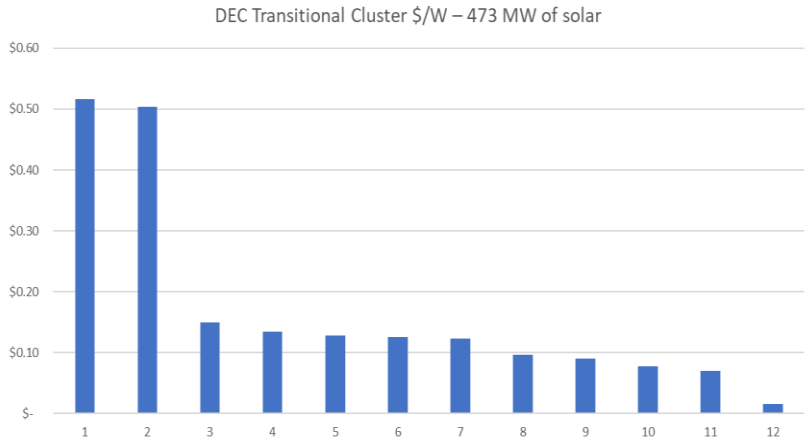


A Single Cluster Study Underrepresents Projects Needed in the Long Term

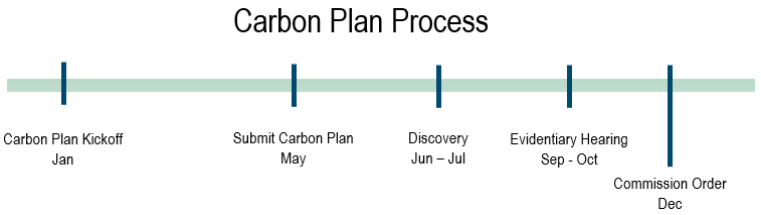
Table I-2: Maximum Solar (MW) Allowed to Connect Annually (by Jan. 1 of year shown)

Beginning of Year	2027	2028	2029	2030+
70% by 2034 with Wind or Nuclear	750	1,050	1,350	1,350
70% by 2030	750	1,050	1,800	1,800

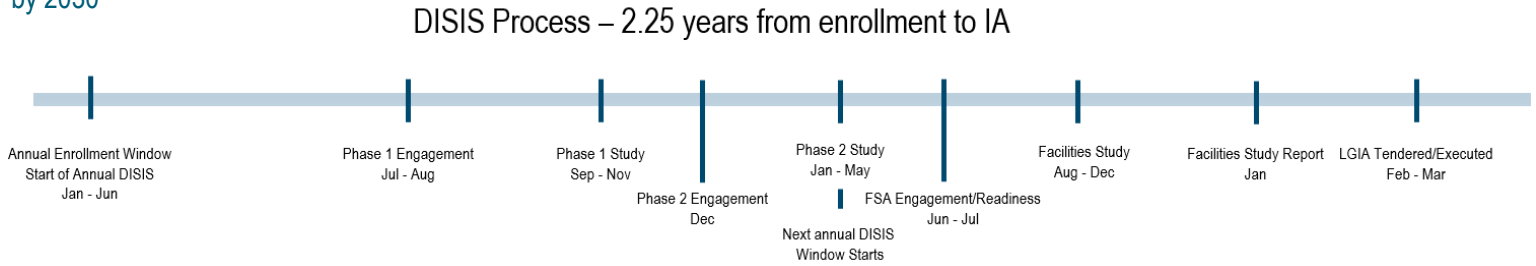




Alternative Approaches: Wait on 2022 DISIS Results and Carbon Plan Approval



- Waiting on Carbon Plan approval through Commission Order would result in at least a minimum of 6-month delay
- 2022 Solar Procurement Bids that are dependent on the RZEP upgrades could be influenced by not considering upgrades in interconnection studies
  - Need for coordinated proactive transmission expansion planning and timely construction identified as key interdependency and execution risk in Carbon Plan (See App. P at 24 for more detailed discussion of Execution and Risk Management).
  - Similar to TCS and prior GIR results, will significantly challenge meeting the needed annual solar interconnections to meet carbon reduction objectives by 2030



- Current DISIS Cluster Study Process takes 1.75 years from the end of Annual Enrollment to a signed Interconnection Agreement if no restudy is required
- Network Upgrade projects start when the IA is signed
- Network Upgrade projects can take up to 4 years from project initiation to the in-service date – dependent on outage coordination and type of upgrade
- Thus, from Enrollment to Operation for a solar facility could take 5.75 years

Takeaways

- Per the formal Local Transmission Planning Process, TAG Members have the opportunity to provide input during and after today's TAG meeting which includes input on whether to proactively include the RZEP projects in Local Transmission Plan
- RZEP Projects need to be considered for all future solar procurements including 2022 to meet timing of carbon reduction objectives – 70% by 2030
- RZEP Projects are cost effective and provide long-term benefit versus a one and done interconnection cycle
- RZEP Projects have additional reliability benefits for the DEC and DEP systems
  - Rebuild projects involve replacing aging structures with new more reliable equipment
  - New higher capacity conductors generally have lower impedance that reduces transmission losses
  - Furthermore, subsequent studies performed at OSC member request showed the RZEP projects do not cause any significant impact on other transmission lines

- **TAG is invited to provide any additional comments or questions to the OSC on the 2022 Mid-Year Update to the 2021 Collaborative Transmission Plan and the proposed RZEP Projects**
- **Provide input by July 6, 2022 to Rich Wodyka (rich.wodyka@gmail.com)**

Questions ?

Regional Studies Reports

Bob Pierce

Duke Energy Carolinas

SERC Long Term Working Group Update

SERC Long Term Working Group

- Completed work on 2022 series of LTWG cases
- Beginning 2027 Summer Study
- Building 2022 series MMWG cases

SERTP

SERTP

- 1st Quarter Meeting (WebEx) was held on March 22th
- 2nd Quarter Meeting (WebEx) will be June 30th
- 2022 Economic Planning Studies

SERTP

No.	Requestor	Source	Sink	MW	Year
1	NCEMC	Southern	DEC	1000	2032 (s)
2	NCEMC	SCE & G	DEC	1000	2032 (s)
3	Santee Cooper	SOCO	SC	600	2027 (w)
4	Santee Cooper	SOCO	SC	500	2024 (s)
5	Santee Cooper	DEC	SC	600	2027 (w)

http://www.southeasternrtp.com/

EIPC

EIPC

- Assisting with DOE on National Transmission Study

Questions ?

2022 TAG Work Plan

Rich Wodyka
Administrator

NCTPC Overview Schedule

Reliability Planning Process

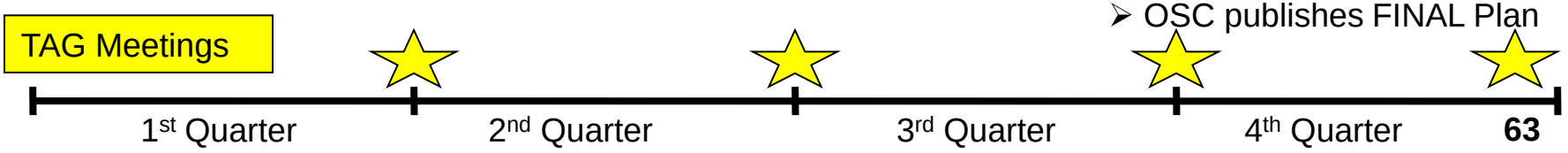
- Evaluate current reliability problems and transmission upgrade plans
- Perform analysis, identify problems, and develop solutions
- Review Reliability Study Results

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
- OSC publishes FINAL Plan



January - February – March

➢ 2021 Study Update

- ✓ **Receive Final 2021 Collaborative Transmission Plan Report**
- ✓ **Receive Draft 2021 Public Policy Study Report**
  - *TAG provide input to the OSC on Public Policy Study results*

➢ 2022 Study – Finalize Study Scope of Work

- ✓ **Receive request from OSC to provide input on proposed Local Economic Study scenarios and interfaces for study**
  - *TAG provide input to the OSC on proposed Local Economic Study scenarios and interfaces for study*
- ✓ **Receive request from OSC to provide input in identifying any public policies that are driving the need for local transmission**
  - *TAG provide input to the OSC in identifying any public policies that are driving the need for local transmission for study*
- ✓ **Receive final 2022 Reliability Study Scope for comment**
  - *TAG review and provide comments to the OSC on the final 2022 Study Scope*

January - February – March

First Quarter TAG Meeting – March 28th

- **2021 Public Policy Study Analysis**
  - ✓ **Receive report on and discuss the final draft of the 2021 Public Policy Study Report**
- **2022 Study Update**
  - ✓ **Receive a report on the Local Economic Study scope and any public policy scenarios that are driving the need for local transmission for study**
  - ✓ **Receive a progress report on the Reliability Planning study activities and the final 2022 Study Scope**

April - May – June

Second Quarter TAG Meeting – June 27

- **2022 Study Update**
  - ✓ **Receive a progress report on study activities**
  - ✓ **Receive update status of the upgrades in the 2021 Collaborative Plan**
  - **TAG is invited to provide any additional comments or questions to the OSC on the 2022 Mid-Year Update to the 2021 Collaborative Transmission Plan and proposed RZEP Projects. Provide input by July 6, 2022 to Rich Wodyka (rich.wodyka@gmail.com)**

July - August – September

Third Quarter TAG Meeting – TBD

- **2022 Study Update**
  - **Receive a progress report on the study activities and preliminary 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 problems identified**

October - November - December

Fourth Quarter TAG Meeting – TBD

- **2022 Study Update**
  - **TAG will receive feedback from the OSC on any alternative solutions that were proposed by TAG members**
  - **Receive and discuss final draft of the 2022 Collaborative Transmission Plan Report**
- **2023 Study Scope**
  - **Discuss potential study scope scenarios for 2023 studies**

Questions ?

TAG
Open Forum Discussion

Comments or Questions ?

June 27, 2022

The Oversight / Steering Committee of the North Carolina Transmission Planning Collaborative

Honors Kim Jones

for your many years of Dedicated Participation and your Contributions on the NCTPC Transmission Advisory Committee.

Wishing you Health and Happiness in your Retirement.

June 27, 2022

The Oversight / Steering Committee of the North Carolina Transmission Planning Collaborative

Honors Mark Byrd

for your many years of Dedicated Service and your Contributions to the Reliable and Economic Development of the North Carolina Transmission System.

Wishing you Health and

Happiness in your Retirement.