CAROLINAS TRANSMISSION COORDINATION ARRANGEMENT (CTCA)

2020/26 SUMMER PEAK RELIABILITY STUDY

FINAL

October 27, 2015

STUDY PARTICIPANTS

Prepared by: **CTCA Power Flow Studies Group (PFSG)**

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Reviewed by: **CTCA Planning Committee (PC)**

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PURPOSE OF STUDY

The purpose of this study is to assess the existing transmission expansion plans of Duke Energy Carolinas ("Duke"), Duke Energy Progress ("Progress"), South Carolina Electric and Gas ("SCEG"), and South Carolina Public Service Authority ("SCPSA") to ensure that the plans are simultaneously feasible. In addition, this study evaluated any potential joint alternatives identified by the Planning Committee ("PC") representatives which might improve the simultaneous feasibility of the Participants' transmission expansion plans through potentially more efficient or cost-effective joint plans. The Power Flow Studies Group ("PFSG") performed the technical analysis outlined in this study scope under the guidance and direction of the PC.

OVERVIEW OF THE STUDY PROCESS

The scope of the proposed study process included the following steps:

1. **Study Assumptions**
   - Study assumptions selected
2. **Study Criteria**
   - Establish the criteria by which the study results will be measured
3. **Case Development**
   - Develop the models needed to perform the study
4. **Study Methodology**
   - Determine the methodologies that will be used to carry out the study
5. **Technical Analysis and Study Results**
   - Perform the technical analysis (thermal, voltage, and stability as needed) and produce the study results
6. **Assessment and Potential Issues Identification**
   - Evaluate the results to identify potential issues
   - Report potential issues to the PC
7. **Potential Alternative Development**
   - Evaluate potential joint alternatives as directed by the PC
8. **Report on the Study Results**
   - Combine the study scope and assessment results into a report

LIST OF RECENT AND CURRENT STUDIES

Study Year	Reliability Study	Description
2010	2014/21 Summer Peak	14S: Near-term 21S: Long-term (VC Summer 2-3)
2011	2015/18 Summer Peak	15S: Near-term 18S: Long-term (VC Summer 2)
2012	2016 Summer Peak/Shoulder	16S: VC Summer Transmission Only 16H: Low Gas Price Dispatch
2013	2019 Summer Peak	19S: Long-term (VC Summer 2-3)
2014	2018/21 Summer Peak	18S: Near-term (VC Summer 2) 21S: Long-term (VC Summer 2-3)
2015	2020/26 Summer Peak	20S: Near-term (VC Summer 2-3) 26S: Long-term (VC Summer 2-3)

STUDY ASSUMPTIONS

- The years studied (study year) were 2020 Summer for a near-term reliability analysis and 2026 Summer for a long-term reliability analysis.
- Generation was dispatched for each Participant in the study cases to meet that Participant's peak and shoulder load in accordance with the designated dispatch order. Participants also provided generation down scenarios for their resources, as requested (e.g., generation outage with description of how generation was replaced, such as by that Participant's dispatch orders).
- PSS/E and/or MUST were used for the study.
- Load growth assumptions were in accordance with each Participant company's practice.
- Generation, interchange, and other assumptions were coordinated between the Participant companies as needed. The 2015 series LTSG cases for 2020 and 2026 summer peak were used as the starting points for study cases and interchange development.
- The PFSG used the 2020 and 2026 summer peak cases to analyze the existing transmission expansion plans to determine if any reliability criteria violations were created. Based on this analysis, the PFSG provided feedback to the PC on the

simultaneous feasibility of these plans for ensuring the reliability of service. The results of this analysis were included in the 2015 study report.

STUDY CRITERIA

The study criteria with which results were evaluated was established, promoting consistency in the planning criteria used across the systems of the Participants, while recognizing differences between individual systems. The study criteria included the following reliability elements:

- NERC Reliability Standards
- Individual company criteria (voltage, thermal, stability, short circuit and phase angle)

CASE DEVELOPMENT

- The latest LTSG models were used as a starting point for the study cases used by the PFSG in their analyses. Systems external to Duke, Progress, SCEG, and SCPSA came directly from the LTSG model.
- The study cases included the detailed internal models for Duke, Progress, SCEG, and SCPSA and included existing transmission additions planned to be in-service for the given year (i.e. in-service by summer 2020 for 2020S cases as well as in-service by summer 2026 for 2026S cases). The detailed internal models were based on the latest publicly available data for each system, i.e., data that had been included in the annual FERC 715 filing.
- The Participants coordinated interchange which included all confirmed long term firm transmission reservations with roll-over rights applicable to the study year(s).
- Duke, Progress, SCEG, and SCPSA each created any requested generation down cases from the common study cases and shared the relevant cases with each other.

  Generation Down Cases Shared

  - Duke: None requested
  - Progress: Brunswick 1, Robinson 2, Roxboro 4, and Harris replaced with TRM import; Asheville CT 1 replaced with CPLE to CPLW import/internal generation redispatch only
  - SCEG: VC Summer 3, Cope, and AM Williams replaced with internal generation
  - SCPSA: Rainey CC, Cross 4 (2020), Cross 3 (2026), and Winyah 4 replaced with internal generation redispatch

STUDY METHODOLOGY

- Initially, power flow analyses were performed based on the assumption that thermal and voltage limits were the controlling limits for the reliability plan. Voltage stability, angular

stability, short circuit and phase angle studies were performed if circumstances warranted.

- Duke, Progress, SCEG, and SCPSA exchanged contingency and monitored element files so that each could test the impact of the other systems' contingencies on its transmission system.

TECHNICAL ANALYSIS AND STUDY RESULTS

The technical analysis was performed in accordance with the study methodology. Results from the technical analysis were reported throughout the study area to identify transmission elements approaching their limits such that all Participants were aware of potential issues and appropriate steps could be identified to correct these issues, including the potential of identifying previously undetected problems.

Duke, Progress, SCEG, and SCPSA reported results throughout the study area based on:

- Thermal loadings greater than 90%.
- Voltages less than individual company criteria.

ASSESSMENT AND POTENTIAL ISSUES IDENTIFICATION

Duke, Progress, SCEG, and SCPSA each ran their own assessments using their own internal planning processes. Each Participant's reliability criteria was used for their transmission facilities. Duke, Progress, SCEG, and SCPSA each documented the reliability issues resulting from their assessments. These results were reviewed and discussed among the PFSG and PC to identify potential joint alternatives which might improve the simultaneous feasibility of the Participants' transmission expansion plans through potentially more efficient or cost-effective joint plans.

POTENTIAL ALTERNATIVE ASSESSMENT

This study allowed for the sharing of information regarding the respective needs of each of the Participants' transmission planners and potential solutions to those needs, as well as the identification and joint evaluation of alternatives to those needs.

- Any potential joint alternatives were identified based on the potential for improved simultaneous feasibility through more efficient or cost-effective joint plans.
- The PFSG assessed the impact of any potential joint alternatives identified by the PC on the simultaneous feasibility of the Participants' transmission expansion plans.
- Duke, Progress, SCEG, and SCPSA tested the effectiveness of any potential joint alternatives using the same cases, methodologies, assumptions and criteria described above.
- The PC did not identify the need to assess any potential joint alternatives based on the study results and a review of the Participants' current transmission expansion plans.

- If an alternative was assessed to be beneficial to the simultaneous feasibility of the Participants' transmission expansion plans, the impacted Participants would perform a more detailed study to evaluate implementing the alternative under their individual Interchange Agreements.

SIMULTANEOUS FEASIBILITY ASSESSMENT

This study allowed the Participants to jointly assess their existing transmission expansion plans in combination with those of their neighbors. By creating a common study case including their existing expansion plans, each company was able to assess a common, coordinated study case using their own internal planning processes. Generation down cases (built from the common study case) were also shared between the Participants to support additional analysis of some significant generation down scenarios which can impact the Participants' neighboring systems. The study team also coordinated a common set of contingency, monitor, and subsystem files to allow each company to analyze their system against contingencies on their neighbors' transmission systems while also monitoring all the Participant systems for potential thermal overloads and voltage concerns.

By comparing the coordinated study's results with the results of their latest set of internal planning studies, each company was able to determine if their neighbors' existing transmission expansion plans would produce potential issues that were previously undetected in their internal planning studies. If the coordinated study results do not show significant, previously undetected issues, then the Participants' current transmission expansion plans were considered simultaneously feasible.

- Study results indicated the Participants' current transmission expansion plans are simultaneously feasible for both 2020 and 2026 Summer Peak conditions with the addition or acceleration of the projects listed in the study results.
- As the Participant companies develop their future transmission expansion plans, the identified issues and projects will be further evaluated for need and timing of project implementation.

REPORT ON STUDY RESULTS

The PFSG compiled the study scope and assessment results into a report for the PC's review and approval. This final report includes a comprehensive summary of all the study activities.

TABLE A
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P01	Rockingham-Wadesboro Tap 230 kV Line	Harris Gd (TRM) Rockingham-West End 230 kV East Line	Loading (99.8 %)	Existing Operating Procedure Opens West End Terminal [2021]
P02	Marion-Dillon Tap 115 kV Line	Brunswick 1 Gd (TRM) Weatherspoon-Latta 230 kV Line	Loading (95.7%)	Existing Operating Procedure Opens Marion Terminal [2023]
P03	Shaw AFB-Eastover (SCEG) 115 kV Line	Robinson 2 Gd (TRM) Sumter-Canadys (SCEG) and Sumter-Wateree (SCEG) 230 kV Lines	Loading (90.0%)	Future Operating Procedure Opens Shaw AFB-Eastover (SCEG) [2026]

TABLE B
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P04	Chestnut Hills-Milburnie 115 kV Line	Brunswick 1 Gd (TRM) Falls-Neuse 115 kV Line	Loading (99.9 %)	Relocate Neuse 115 kV Substation to Falls-Method 115 kV Line [2027]
P05	Apex US1-Apex 230 kV Line	Roxboro 4 Gd (TRM) Harris-RTP 230 kV Line	Loading (99.5 %)	Replace Ancillary Equipment [2027]
P06	Castle Hayne-Vista 115 kV Line	Castle Hayne-Folkstone 230 kV Line	Loading (96.0 %)	Loop Brunswick-Jacksonville 230kV into Folkstone Sub [2029]
P07	Ellerbe-Wadesboro Tap 230kV Line	Harris Gd (TRM) Rockingham-West End East 230kV Line	Loading (94.7 %)	Existing Operating Procedure Opens West End Terminal [2029]

TABLE B (continued)
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P08	Sutton-Wilmington Ninth & Orange 230 kV Line	Brunswick 1 Gd (TRM) Brunswick 2-Town Creek 230 kV Line	Loading (94.5 %)	Existing Operating Procedure Backs Down Brunswick 2 [2029]
P09	Sutton Plant-Delco 115 kV Line	Sutton Plant-Industry 070 115 kV Line	Loading (94.5 %)	Replace Ancillary Equipment [2029]
P10	Camden-Industry 104 115 kV Line	Harris Gd (TRM) Camden-Camden Junction 115 kV Line	Loading (93.3 %)	Existing Operating Procedure Opens Wateree Terminal [2030]
P11	Cape Fear-Lillington 115 kV Line	Brunswick 1 Gd (TRM) Harris Plant-Erwin 230 kV Line	Loading (93.3 %)	Future Operating Procedure Opens Cape Fear Terminal [2030]

TABLE B (continued)
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P12	Florence 230/115 kV Transformer 2	Brunswick 1 Gd (TRM) Florence 230/115 kV Transformer 1	Loading (93.1 %)	Replace Ancillary Equipment [2030]
P13	Goldsboro-E13 Arba 115 kV Line	Wommack-Industry 053 230 kV Line	Loading (92.5 %)	Future Operating Procedure Opens Goldsboro Terminal [2030]
P14	Barnard Creek-Town Creek 230 kV Line	Brunswick 1 Gd (TRM) Sutton Plant-Castle Hayne 230 kV Line	Loading (91.1 %)	Future Operating Procedure Energizes Alternate Line [2031]

TABLE C
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D01	Great Falls-Wateree 100 kV Line 1/2 (Wateree)	Rainey CC Gm Great Falls-Wateree 100 kV Line 2/1 (Wateree)	Loading (115.1 %)	Existing Operating Procedure [2020]
D02	High Rock-Tuckertown 100 kV Lines (Yadkin Facilities)	Belews Creek 1 Gm Pleasant Garden-Woodleaf 500 kV Line with Shunt Reactor (Godbey)	Loading (115.4 %)	Existing Operating Procedure [2020]
D03	Badin-Tuckertown 100 kV Lines (Yadkin Facilities)	Belews Creek 1 Gm Pleasant Garden-Woodleaf 500 kV Line with Shunt Reactor (Godbey)	Loading (102.6 %)	Existing Operating Procedure [2020]
D04	Concord-Concord City 100 kV Line (Batte)	Buck CC Gm Winecoff 100 kV Capacitor	Loading (98.8 %)	1.63 miles 336 ACSR Reconductor [2021] Accelerated 15 Years

TABLE C (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D05	Laurens 31-Greenbriar SS 100 kV Line (Mauldin)	Cliffside 5 Gm Tiger 230/100/44 kV Transformer 6	Loading (95.6 %)	2.96 miles 477 ACSR Reconductor [2024] Accelerated 4 Years
D06	Peach Valley-Enola 100 kV Line (Cherokee)	Cliffside 5 Gm Cliffside 230/100/44 kV Transformer A1 Close 44 kV Bank A2	Loading (95.0 %)	1.26 miles 2/0 Cu Reconductor [2024] Accelerated 3 Years
D07	Parkwood 500/230 kV Transformer 5	Roxboro 4 Gd (TRM) Parkwood 500/230 kV Transformer 6	Loading (100.7 %)	New Operating Procedure [2020] Trip Parallel Bank or Open 500 kV line
D08	Ashe St-Durham 100 kV Line (Ashe St)	Harris Gd (TRM) Parkwood-Pleasant Garden 500 kV Line (Parkwood)	Loading (94.0 %)	3.26 miles 477 ACSR Reconductor [2025]

TABLE C (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D09	High Point City 4 -Willow Creek 100 kV Line (Linden St)	Harris Gd (TRM) Buck 230/100/44 kV Transformer 4	Loading (94.0 %)	3.22 miles 477 ACSR Reconductor [2025]
D10	Red Rose-Lancaster Retail -Mini Ranch Retail 100 kV Line (Monroe)	Harris Gd (TRM) Morning Star 230/100 kV Transformer 4, Morning Star-Newport 230 kV Line (Sandy Ridge)	Loading (98.5 %)	8.94 miles 2/0 Cu Reconductor [2022]
D11	Cane Creek-Pelham 100 kV Line (Mauldin Black)	Lee CC Gm Cane Creek-Greenbriar SS 100 kV Line (Mauldin White)	Loading (108.9 %)	3.61 miles 477 ACSR Reconductor [2025] Accelerated 3 Years
D12	China Grove-Swink Tap 100 kV Line (Collins)	Belews Creek 1 Gm Buck 230/100 kV Transformer A4	Loading (101.0 %)	4.85 miles 477 ACSR Reconductor [2020]

TABLE C (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D13	Winecoff-Brantley Rd Retail 100 kV Line (Buck)	Belews Creek 1 Gm Buck 230/100 kV Transformer A4	Loading (97.5 %)	2.91 miles 477 ACSR Reconductor [2022]
D14	Winecoff-Manchester Retail 100 kV Line (China Grove)	Belews Creek 1 Gm Buck 230/100 kV Transformer A4	Loading (96.1 %)	0.94 miles 477 ACSR Reconductor [2023]
D15	Beckerdite-Willow Creek 100 kV Line (Linden St Black)	Harris Gd (TRM) Beckerdite-Willow Creek 100 kV Line (Linden St Black)	Loading (100.9 %)	9.74 miles 477 ACSR Reconductor [2020]

TABLE D
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D16	Stamey-Statesville 100 kV Line 1 (Hinkle Black)	Buck CC Gm Stamey-Statesville 100 kV Line 2 (Hinkle White)	Loading (100.6 %)	5.30 miles 795 ACSR Reconductor [2026] Accelerated 10 Years
D17	Stamey-Fourth Creek Tap 100 kV Line (McClain Black)	Belews Creek 1 Gm Stamey-Fourth Creek Tap 100 kV Line (McClain White)	Loading (109.7 %)	9.94 miles 2-477 ACSR Reconductor [2027] Accelerated 7 Years
D18	Mitchell River-Surry Yadkin 7 100 kV Line (Bannertown White)	Belews Creek 1 Gm Mitchell River-Bannertown 100 kV Line (Bannertown Black)	Loading (102.0 %)	6.46 miles 336 ACSR Reconductor [2026] Accelerated 7 Years
D19	Newport-Morning Star 230 kV Line (Sandy Ridge)	McGuire 1 Gm Newport-Richmond 500 kV Line without Reactors (DEC-DEP Tie)	Loading (105.4 %)	33.59 miles 954 ACSR Add Second Circuit [2030] Accelerated 5 Years

TABLE D (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D20	Bush River-Laurens 30 100 kV Line (Clinton)	Lee CC Gm Lee-Laurens 33 100 kV Line (Rabon)	Loading (95.5 %)	12.99 miles 2/0 Cu Reconductor [2030] Accelerated 6 Years
D21	Wylie-York 16-York 15 100 kV Line (Weddington)	McGuire 1 Gm Morning Star 230/100 kV Transformer 4, Morning Star-Newport 230 kV Line (Sandy Ridge)	Loading (96.3 %)	Planned Springfield SS Project
D22	Cliffside 230/100/44 kV Transformer A2	Cliffside 5 Gm Cliffside 230/100/44 kV Transformer A1 Close 44 kV Bank A2	Loading (98.9 %)	New Transformer Capacity Needed [2027] Accelerated 2 Years
D23	Beckerdite 230/100 kV Transformer 3	Dan River CC Gm Beckerdite 230/100 kV Transformer 1	Loading (107.2 %)	Replace Existing Bank 2 or 3 with New 400 MVA [2026] Accelerated 4 Years

TABLE D (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D24	Fisher Tap-York 15 100 kV Line (Weddington)	McGuire 1 Gm Morning Star 230/100 kV Transformer 4, Morning Star-Newport 230 kV Line 1 (Sandy Ridge)	Loading (95.1 %)	Planned Springfield SS Project
D25	Pelham-Laurens 28 100 kV Line (Mauldin)	Cliffside 5 Gm Shady Grove-Greenbriar SS 100 kV Line (Greenbriar)	Loading (98.7 %)	3.39 miles 477 ACSR Reconductor [2027]
D26	Amity SS-Sharon Retail 100 kV Line (Sharon)	Harris Gd (TRM) Morning Star 230/100 kV Transformer 4, Morning Star-Newport 230 kV Line (Sandy Ridge)	Loading (102.1 %)	2.57 miles 954 ACSR Reconductor [2026]
D27	Lee-Davis Retail 100 kV Line (Central Black)	Lee CC Gm Lee-Central and Central-Piercetown 100 kV Lines (Central White and Black)	Loading (93.4 %)	5.49 miles 954 AAC Reconductor or Rebuild Inactive Lee-Piercetown (Refuge) Line [2031]

TABLE D (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D28	North Greensboro 230/100/44 kV Transformer 3	Dan River CC Gm North Greensboro 230/100/44 kV Transformer 2	Loading (95.9 %)	New Transformer Capacity or Place Existing Spare In-Service [2030]
D29	Greensboro-Fairfax 100 kV Line (Greensboro)	Robinson 2 Gd (TRM) Buck 230/100 kV Transformer 4	Loading (96.2 %)	2.30 miles 795 ACSR Reconductor [2029]
D30	Lincoln-Riverbend 230 kV Line (Dutchman)	McGuire 1 Gm Bad Creek-Jocassee 500 kV Line (Whitewater)	Loading (95.3 %)	11.62 miles 2-795 ACSR Reconductor [2030]
D31	Shelby 230/100/44 kV Transformer 3	Catawba 1 Gm Shelby 230/100/44 kV Transformer 2	Loading (93.8 %)	New Transformer Capacity [2031]

TABLE E
SOUTH CAROLINA ELECTRIC AND GAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
S01	Salem-Fairfax 115 kV Line	Vogtle-West McIntosh 500 kV Line (SOCO)	Loading (103.0%)	Existing Operating Procedure Opens at Baldock-Allendale [2020]
S02	Stevens Creek -Thurmond (SEPA) 115 kV Line	Roxboro 4 Gd (TRM) SRS-Vogtle (SOCO) and VCS2-Ward 230kV Lines	Loading (101.0%)	Existing Operating Procedure Reduces Generation at Thurmond or Open Line [2020]
S03	Denny Terrace 230/115 kV Transformer 1/2	Denny Terrace-Lyles 230 kV Line and Denny Terrace 230/115 kV Transformer 2/1	Loading (96.0%)	Existing Operating Procedure to open Denny Terrace-Lyles 115 kV Lines [2020]
S04	Lyles 230/115 kV Transformer	Denny Terrace 230/115 kV Transformers 1-2	Loading (92.0 %)	Existing Operating Procedure Changes N.O. Point on Lyles-Williams St. 115 kV Line [2020]

TABLE E (continued)
SOUTH CAROLINA ELECTRIC AND GAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
S05	Orangeburg 230/115 kV Transformer 1/2	Orangeburg-St. George 230 kV Line and Orangeburg 230/115 kV Transformer 2/1	Loading (95.0%)	Future Operating Procedure Opens Orangeburg-St. George 115 kV Lines [2020]
S06	Summerville 230/115 kV Transformer 1/2	Pepperhill-Summerville 230 kV Line and Summerville 230/115 kV Transformer 2/1	Loading (96.0 %)	Future Operating Procedure Closes Pepperhill-Summerville 115 kV Line [2020]
S07	Church Creek 230/115 kV Transformer 1/2	AM Williams Gd Church Creek-Faber Place 230 kV Line and Church Creek 230/115 kV Transformer 2/1	Loading (104.0 %)	Add 3rd Autobank at Church Creek 230/115 kV Substation [2020]
S08	Coit-Williams St. 115 kV Line	Edenwood-Lyles and Edenwood-Lake Murray 230 kV Lines	Loading (110.0 %)	Reconductor Remaining Coit-Williams St. 115 kV Line with 1272 ACSR [2020]

TABLE E (continued)
SOUTH CAROLINA ELECTRIC AND GAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
S09	Lake Murray 230/115 kV Transformer 1/2	Lake Murray 230/115 kV Transformer 2/1 and Saluda River 230/115 kV Transformer	Loading (110.0 %)	Re-terminate CIP-Lake Murray to CIP-Saluda Hydro 115 kV Line via Saluda Hydro-Lake Murray 115 kV Line [2020]
S10	CIP-Lake Murray 115 kV Line	CIP-Edenwood 115 kV Line and CIP 230/115 kV Transformer	Loading (107.0 %)	Reconductor Remaining CIP-Lake Murray 115 kV Line with 1272 ACSR [2020]
S11	Graniteville 230/115 kV Transformer 1/2	Graniteville 230/115 kV Transformer 2/1 and Graniteville 230/115 kV Transformer 3	Loading (102.0 %)	Upgrade Graniteville 230/115 kV Transformers 1/2 to 336 MVA [2020]
S12	Pepperhill-Faber Place 230 kV Line	Church Creek-Ritter and Church Creek-Canadys 230 kV Lines	Loading (96.0 %)	Fold-In AMW-Faber Place 230 kV Line to Pepperhill Substation [2020]

TABLE E (continued)
SOUTH CAROLINA ELECTRIC AND GAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
S13	Canadys-Church Creek 230 kV Line	AM Williams Gd St. George-Summerville 230 kV Lines 1-2	Loading (110.0 %)	Reconductor Canadys-Church Creek 230 kV Line with Bundled 1272 ACSR [2020]

TABLE F
SOUTH CAROLINA ELECTRIC AND GAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
S14	Pineland 230/115 kV Transformer 1/2	Killian 230/115 kV Transformer and Pineland 230/115 kV Transformer 2/1	Loading (96.0 %)	Future Operating Procedure Opens Pineland-Blythewood SS 115 kV Line [2026]
S15	Saluda River 230/115 kV Transformer	Lake Murray 230/115 kV Transformers 1-2	Loading (96.0 %)	Future Operating Procedure Cranks Saluda Hydro Units [2026]
S16	Edenwood-Edmund SS 115 kV Line	VC Summer 3 Gd Graniteville #2-Aiken Hampton and AGY-Toolebeck 115 kV Lines	Loading (92.0 %)	Existing Operating Procedure Increases Generation at Urquhart Plant [2026]
S17	Urquhart-Toolebeck 115 kV Line	Cope Gd Graniteville #2-Aiken Hampton and Urquhart-Graniteville 115 kV Lines	Loading (96.0 %)	Future Operating Procedure Reduces Generation at Urquhart Plant [2026]

TABLE F (continued)
SOUTH CAROLINA ELECTRIC AND GAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2026 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
S18	Graniteville-Graniteville #2 115 kV Line	VC Summer 3 Gd Urquhart-Graniteville #2 and Graniteville-Graniteville #2 230 kV Lines	Loading (92.0 %)	Open Graniteville-Graniteville #2 115 kV Line [2026]
S19	Salem-Fairfax 115 kV Line	Vogtle-W. McIntosh 500 kV Line (SOCO)	Loading (113.0 %)	Install 1200 MVA 4% Series Reactor at SRS [2021]
S20	Lyles-Dunbar Rd 115 kV Line	Cope Gd Edenwood-Dunbar Rd 115 kV Line and VCS2-Orangeburg 230 kV Line	Loading (100.0 %)	Rebuild Remaining Lyles-Dunbar Rd 115 kV Line to 1272 ACSR [2026]

TABLE G
SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2020 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
C01	Purrysburg 230/115 kV Transformer	Purrysburg-Bluffton 230 kV Line	Loading (142.0%)	Future Operating Procedure [2020]
C02	VC Summer -Blythewood 230 kV Line	Robinson 2 Gd (TRM) VC Summer -Winnsboro 230 kV Line	Loading (101.0%)	Future Operating Procedure [2020]
C03	Perry Road-Myrtle Beach 115 kV Line	Dunes-Myrtle Beach 115 kV Line	Loading (98%)	5.40 miles 556 ACSR Reconductor [2022]

FIGURE A
POTENTIAL PROJECTS

PROJECT MAP REMOVED
Contains Critical Energy Infrastructure Information (CEII)