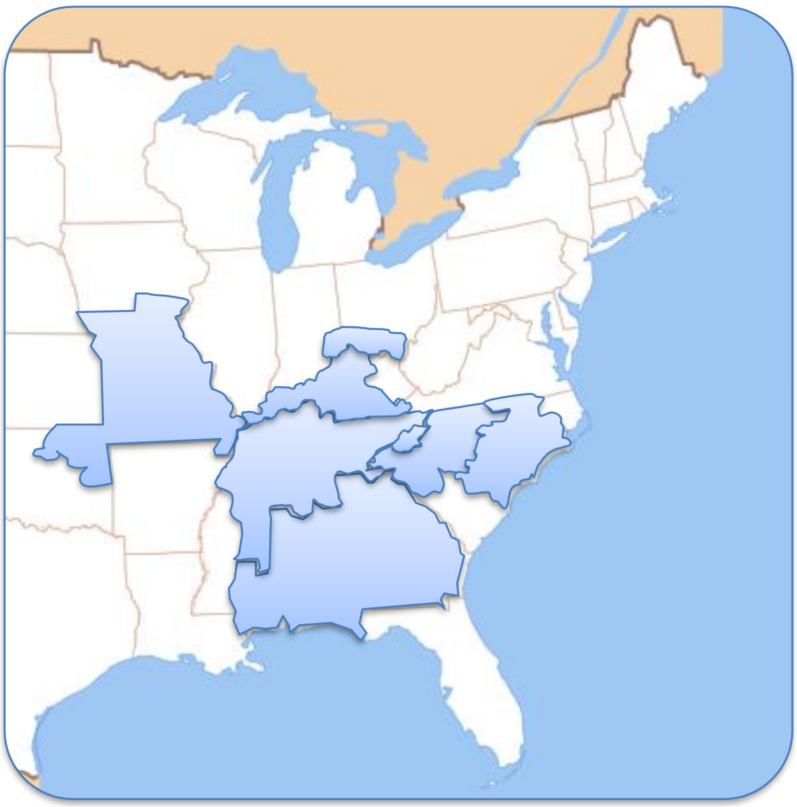
Southeastern Regional TRANSMISSION PLANNING

2018 Economic Planning Studies

SERTP Southeastern Regional Transmission Planning

Economic Planning Studies
Final Results



November 29, 2018

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Overview of Economic Planning Studies

Executive Summary

The Regional Planning Stakeholder Group ("RPSG") identified three (3) economic planning studies to be evaluated under the Southeastern Regional Transmission Planning ("SERTP") process. The SERTP Sponsors have performed analyses to assess potential constraints on the transmission systems of the participating transmission owners for the stakeholder requested economic planning studies selected by the Regional Planning Stakeholder Group ("RPSG"). The assessments include the identification of potentially limiting facilities, the impact of the transfers on these facilities, and the contingency conditions causing the limitations. The assessments also identify potential transmission enhancements within the footprint of the participating transmission owners necessary to accommodate the economic planning study requests, planning-level cost estimates, and the projected need-date for projects to accommodate the economic planning study requests. The information contained in this report does not represent a commitment to proceed with the recommended enhancements nor implies that the recommended enhancements could be implemented by the study dates. The assessment cases model the currently projected improvements to the transmission system. However, changes to system conditions and/or the transmission system expansion plans could also impact the results of this study. Planning staff of the participating transmission owners performed the assessments and the results are summarized in this report.

Study Assumptions

The specific assumptions selected for these evaluations were:

- The load levels evaluated were Summer Peak unless otherwise indicated below. Additional load levels were evaluated as appropriate.
- Each request was evaluated for the year identified below, as selected by the RPSG
- The following economic planning studies were assessed:

1) **Southern BAA to Santee Cooper Border – 1000 MW**
   - **Year:** 2021
   - **Load Level:** Summer Peak
   - **Type of Transfer:** Generation to Load
   - **Source:** Generation scale within Southern BAA
   - **Sink:** Uniform Load scale within Santee Cooper

2) **Santee Cooper Border to Duke Energy Carolinas and Duke Energy Progress – 1000 MW**
   - **Year:** 2021
   - **Load Level:** Summer Peak
   - **Type of Transfer:** Load to Generation
   - **Source:** Uniform load scale within Santee Cooper
   - **Sink:** Generation scale in Duke Energy as shown in Table 1 below:

Table 1: Generation Scale within Duke Energy

Balancing Authority Area	Area #	MW Allocation
Duke Energy Carolinas	342	-500
Duke Energy Progress	340, 341	-500
Total		-1000

3) **Duke Energy Carolinas and Duke Energy Progress to Santee Cooper Border – 1000 MW**
   - **Year:** 2021
   - **Load Level:** Summer Peak
   - **Type of Transfer:** Generation to Load
   - **Source:** Generation scale within Duke Energy as shown in Table 2 below:
   - **Sink:** Uniform load scale within Santee Cooper

Table 2: Generation Scale within Duke Energy

Balancing Authority Area	Area #	MW Allocation
Duke Energy Carolinas	342	+500
Duke Energy Progress	340, 341	+500
Total		+1000

Case Development

- For all evaluations, the ***2018 Series Version 2 SERTP Regional Models*** were used as a starting point load flow cases for the analysis of the Economic Planning Scenarios.

Study Criteria

The study criteria with which results were evaluated included the following reliability elements:

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

Methodology

Initially, power flow analyses were performed based on the assumption that thermal limits were the controlling limit for the reliability plan. Voltage, stability, and short circuit studies were performed if circumstances warranted.

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 participating transmission owners and stakeholders would be aware of any potential issues and, as such, suggest appropriate solutions to address the potential issues if necessary. The SERTP reported, at a minimum, results on elements of 115 kV and greater within the participating transmission owners' footprint based on:

- Thermal loadings greater than 90% for facilities that are negatively impacted by the proposed transfers and change by +5% of applicable rating with the addition of the transfer(s)
- Voltages appropriate to each participating transmission owner's planning criteria (with potential solutions if criteria were violated)

Assessment and Problem Identification

The participating transmission owners ran assessments to identify any constraints within the participating transmission owners' footprint as a result of the economic planning study requests. Each participating transmission owner applied their respective reliability criteria for its facilities and any constraints identified were documented and reviewed by each participating transmission owner.

Solution Development

- The participating transmission owners, with input from the stakeholders, will develop potential solution alternatives due to the economic planning studies requested by the RPSG.
- The participating transmission owners will test the effectiveness of the potential solution alternatives using the same cases, methodologies, assumptions and criteria described above.
- The participating transmission owners will develop rough, planning-level cost estimates and in-service dates for the selected solution alternatives.

Report on the Study Results

The participating transmission owners compiled all the study results and prepared a report for review by the stakeholders. The report contains the following:

- A description of the study approach and key assumptions for the Economic Planning Scenarios
- For each economic planning study request, the results of that study including:
    1. Limit(s) to the transfer
    2. Selected solution alternatives to address the limit(s)
    3. Rough, planning-level cost estimates and in-service dates for the selected transmission solution alternatives

I. Study Request 1 Results

Southern BAA to Santee Cooper

2021

1000 MW

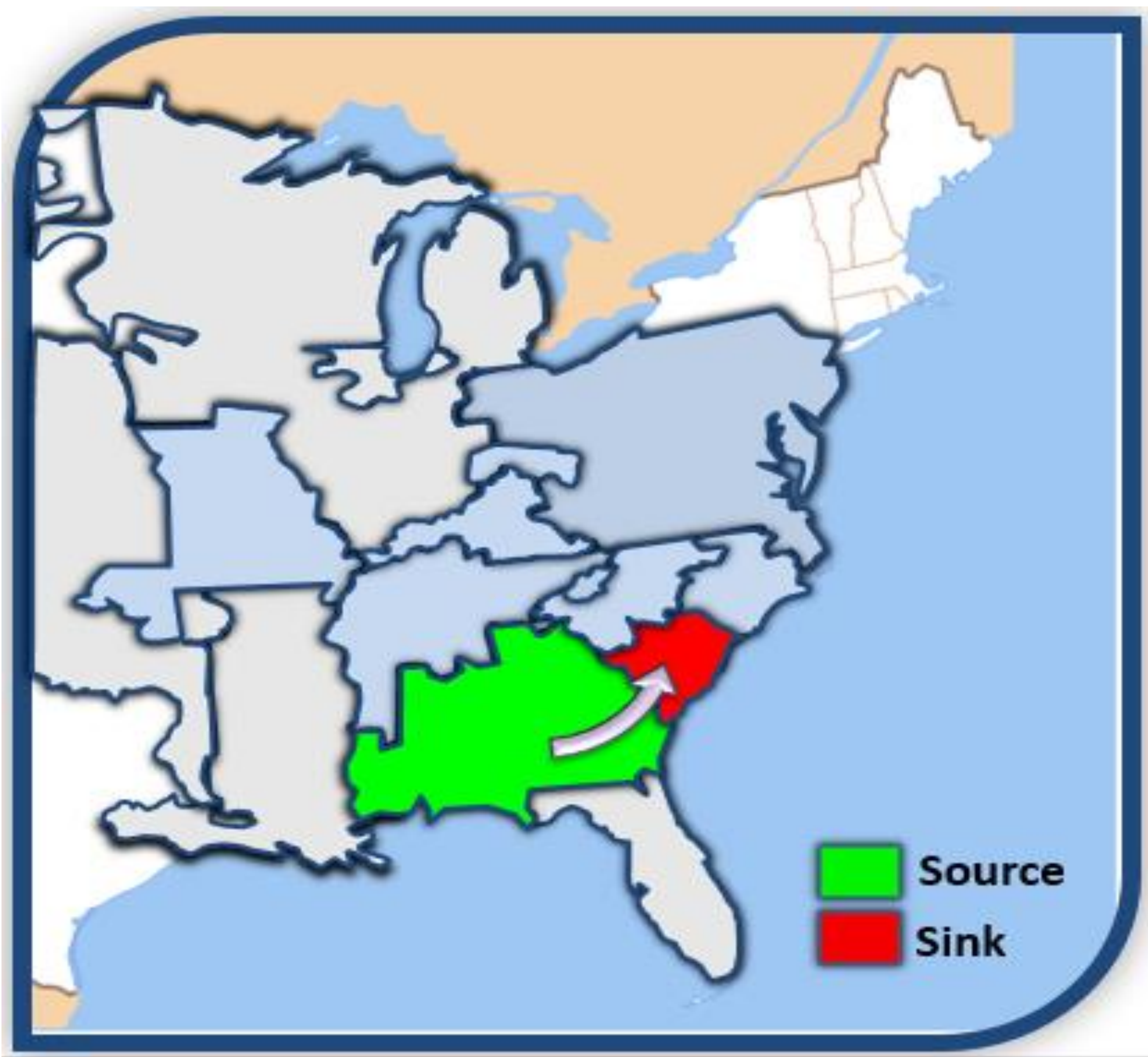
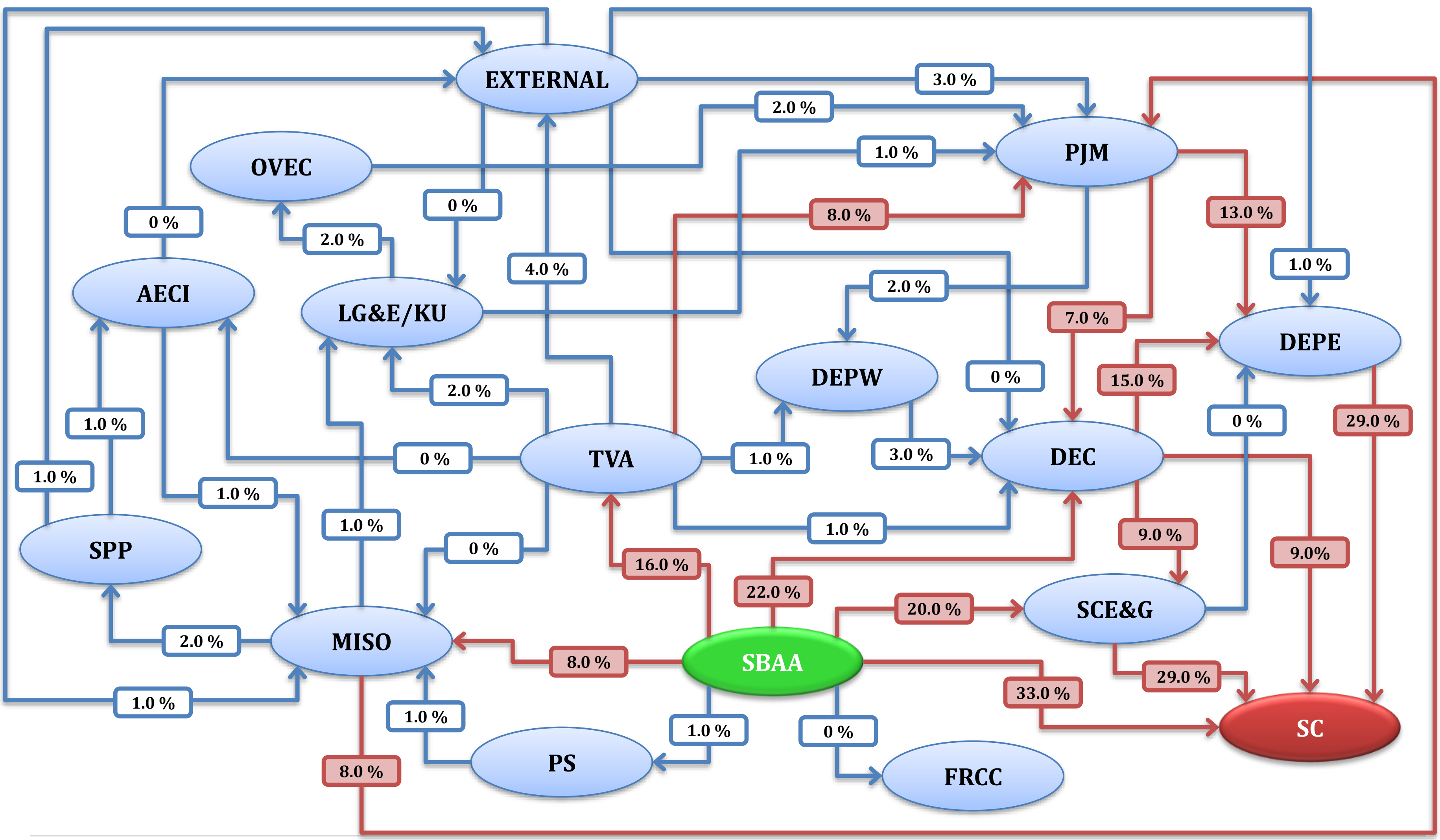


Table I.1.1. Total Cost Identified by the SERTP Sponsors

Balancing Authority Area	Planning Level Cost Estimate
Associated Electric Cooperative (AECI)	$0
Duke Carolinas (DEC)	$26,400,000
Duke Progress East (DEPE)	$0
Duke Progress West (DEPW)	$0
Louisville Gas & Electric and Kentucky Utilities (LG&E/KU)	$0
Ohio Valley Electric Corporation (OVEC)	$0
PowerSouth (PS)	$0
Southern (SBAA)	$16,080,000
Tennessee Valley Authority (TVA)	$0
TOTAL ($2018)	**$42,480,000**

<u>Diagram I.1.1.</u> Transfer Flow Diagram (% of Total Transfer)



Associated Electric Cooperative Balancing Authority Area (AECI) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.2.1. Pass 0 – Transmission System Impacts with No Enhancements – *AECI*

The following table identifies significant ***AECI*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
AECI	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.2.2. Pass 1 – Potential Future Transmission System Impacts – *AECI*

The following table depicts thermal loadings of ***AECI*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
AECI	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.2.3. Potential Solutions for Identified Problems – *AECI*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	None Required	--	--
AECI TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Duke Carolinas Balancing Authority Area (DEC) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.3.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEC*

The following table identifies significant ***DEC*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
DEC	Hodges Tie – Coronaca Tie 100kV T.L.	129	115.1	133.8	Loss of parallel Hodgest Tie – Coronaca 100kV T.L.	1	P1
DEC	Laurens Tie – Bush River Tie 100kV T.L.	65	80.2	101.9	Santee Cooper – Newberry – Greenwood 230kV T.L.	2	P2, P3

Scenario Explanations:

1. System Normal, Summer Peak Case
2. VC Summer Unit 1 Offline, Summer Peak Case

Table I.3.2. Pass 1 – Potential Future Transmission System Impacts – *DEC*

The following table depicts thermal loadings of ***DEC*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
DEC	Bush River Tie – Georgia Pacific Tap (SCEG) 115 kV T.L.	79	72.6	95.2	Santee Cooper – Newberry – Greenwood 230kV T.L.	1	--

Scenario Explanations:

1. VC Summer Unit 1 Offline, Summer Peak Case

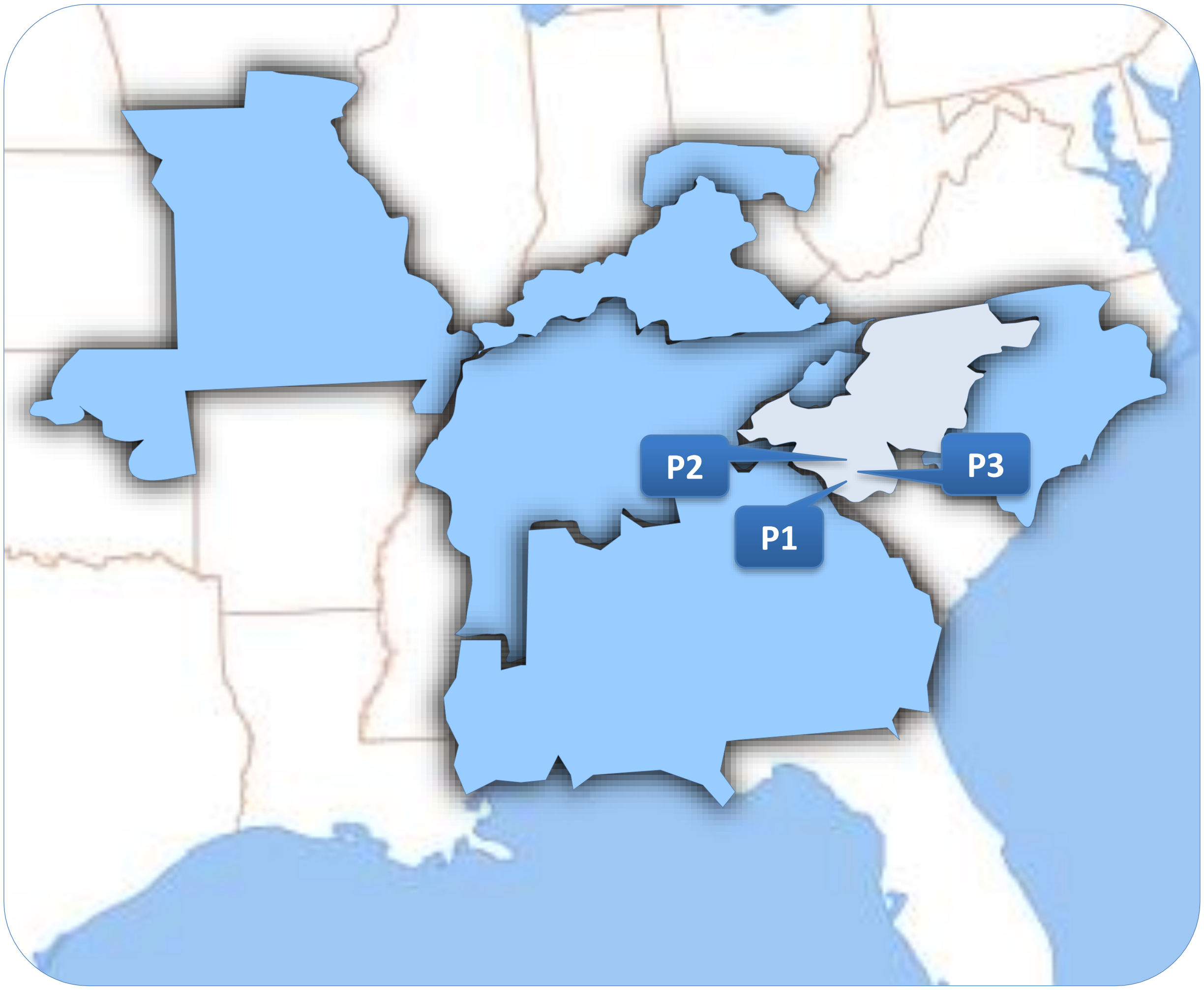
Table I.3.3. Potential Solutions for Identified Problems – *DEC*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
1	Rebuild Hodges Tie – Coronaca Tie 100kV double circuit transmission line with 954 ACSR conductors. Total line distance is 9.2 miles.	2021	$12,700,000
2	Install a 28.8 MVAR capacitor bank at Laurens Tie.	2021	$900,000
3	Rebuild approximately 8.0 miles of Laurens Tie – Bush River Tie 100kV double circuit transmission line with 954 ACSR conductors.	2021	$12,800,000
DEC TOTAL ($2018)			**$26,400,000** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

<u>Diagram I.3.1.</u> Approximate Location of Potential Solutions – *DEC*



Duke Progress East Balancing Authority Area (DEPE) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.4.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEPE*

The following table identifies significant ***DEPE*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
DEPE	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.4.2. Pass 1 – Potential Future Transmission System Impacts – *DEPE*

The following table depicts thermal loadings of ***DEPE*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
DEPE	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.4.3. Potential Solutions for Identified Problems – *DEPE*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
DEPE TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Duke Progress West (DEPW) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.5.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEPW*

The following table identifies significant ***DEPW*** thermal constraints without any enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
DEPW	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

<u>Table I.5.2.</u> Pass 1 – Potential Future Transmission System Impacts – *DEPW*

The following table depicts thermal loadings of ***DEPW*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
DEPW	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.5.3. Potential Solutions for Identified Problems – *DEPW*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
DEPW TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Louisville Gas & Electric and Kentucky Utilities Balancing Authority Area (LG&E/KU) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.6.1. Pass 0 – Transmission System Impacts with No Enhancements – *LG&E/KU*

The following table identifies significant ***LG&E/KU*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
LG&E/KU	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

<u>Table I.6.2.</u> Pass 1 – Potential Future Transmission System Impacts – *LG&E/KU*

The following table depicts thermal loadings of ***LG&E/KU*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
LG&E/KU	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.6.3. Potential Solutions for Identified Problems – *LG&E/KU*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	None Required	--	--
LG&E/KU TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Ohio Valley Electric Corporation Balancing Authority Area (OVEC) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.7.1. Pass 0 – Transmission System Impacts with No Enhancements – *OVEC*

The following table identifies significant ***OVEC*** thermal constraints without any enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
OVEC	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.7.2. Pass 1 – Potential Future Transmission System Impacts – *OVEC*

The following table depicts thermal loadings of ***OVEC*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
OVEC	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.7.3. Potential Solutions for Identified Problems – *OVEC*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
OVEC TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

PowerSouth Balancing Authority Area (PS) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.8.1. Pass 0 – Transmission System Impacts with No Enhancements – *PS*

The following table identifies significant ***PS*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
PS	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.8.2. Pass 1 – Potential Future Transmission System Impacts – *PS*

The following table depicts thermal loadings of ***PS*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
PS	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.8.3. Potential Solutions for Identified Problems – *PS*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	None Required	--	--
PS TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Southern Balancing Authority Area (SBAA) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.9.1. Pass 0 – Transmission System Impacts with No Enhancements – *SBAA*

The following table identifies significant **SBAA** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
SBAA	381093 3OFFERMAN 115 - 381434 3OFF CHIP 115	91	98.5	107.5	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	1	1
SBAA	380263 3SATILLA CK 115 - 381434 3OFF CHIP 115	91	98.3	107.4	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	1	1
SBAA	380263 3SATILLA CK 115 - 381094 3SCREVEN 115	91	96.3	105.2	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	1	1

Scenario Explanations:

1. McIntosh Unit #10 Offline, Summer Peak Case

Table I.9.2. Pass 1 – Potential Future Transmission System Impacts – *SBAA*

The following table depicts thermal loadings of ***SBAA*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
SBAA	380756 3ARKWRGHT B 115 - 381659 3BASS RD J 115	145	82.0	92.9	380758 3FORREST MAC 115 - 382303 3WESLEYAN DR 115	1	--
SBAA	380817 3SINCLAIRDA 115 - 380818 3S DEVEREUX 115	57	88.0	96.4	381413 6THOMSON 230 - 381490 8THOMSON 500	2	--
SBAA	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	85	93.4	100.0	381093 3OFFERMAN 115.00 381434 3OFF CHIP 115	3	--
SBAA	381095 3JESUP 115 - 381099 3N JESUP 115	124	79	92.2	380009 8W MCINTOSH 500 - 382113 8S_VOG_W MAC 500	3	--
SBAA	381094 3SCREVEN 115.00 381095 3JESUP 115.00 1	91	87.8	96.3	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	3	--
SBAA	381098 3BRENTWOOD 115 - 382153 3TANK RD J 115	85	85.7	92.4	381093 3OFFERMAN 115 - 381434 3OFF CHIP 115	3	--
SBAA	381448 3METTER 115 - 383103 3LIVE OAK 115	79	90.5	96.5	380008 8VOGTLE B3-4 500 - 382113 8S_VOG_W MAC 500	3	--
SBAA	389001 6MCINTOSH 230 - 312538 6PURYSB2 230 #2	956	70.6	98.5	312721 6PURRYSB 230 - 389001 6MCINTOSH 230 #1	4	--
SBAA	312721 6PURRYSB 230 - 389001 6MCINTOSH 230 #1	956	70.6	98.6	389001 6MCINTOSH 230 - 312538 6PURYSB2 230 # 2	4	--
SBAA	382102 6HATCH SS 2 230 - 382361 6VIDALIA B2 230	509	82.8	91.3	380018 8SCHERER 500 - 383052 8WARTHEN 500	5	--
SBAA	380160 6HATCH 230 - 382102 6HATCH SS 2 230	509	81.7	91.3	380018 8SCHERER 500 - 383052 8WARTHEN 500	5	--

Scenario Explanations:

1. Vogtle Unit #1 Offline, Shoulder (93% Load Level) Case
2. Vogtle Unit #1 Offline, Summer Peak Case
3. McIntosh Unit #10 Offline, Summer Peak Case
4. Jasper Unit Offline, Summer Peak Case
5. Vogtle Unit #2 Offline, Shoulder (93% Load Level) Case

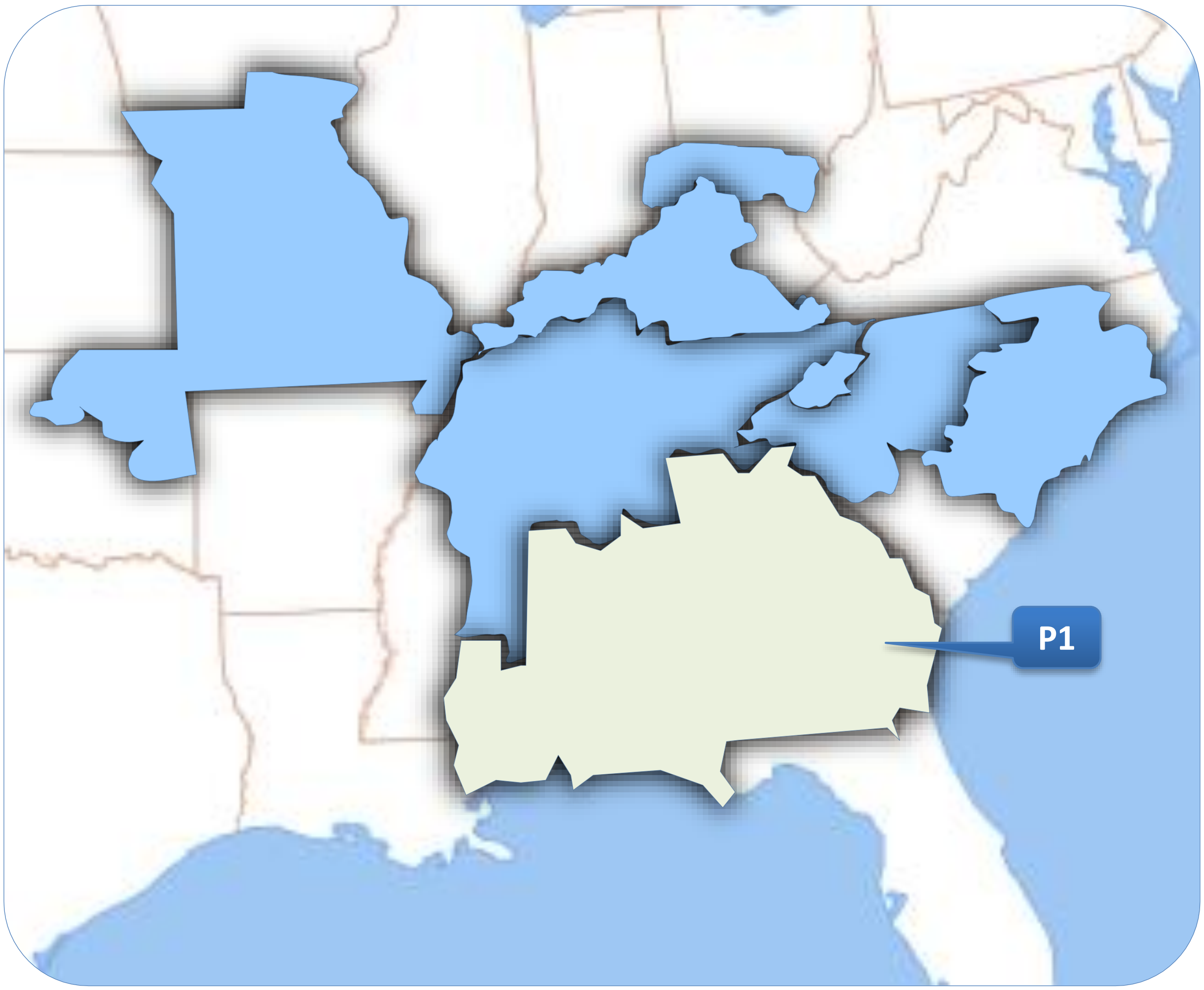
Table I.9.3. Potential Solutions for Identified Problems – *SBAA*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
P1	**OFFERMAN – JESUP 115kV Transmission Line Rebuild** • Rebuild approximately 20.1 miles of the Offerman – Jesup 115kV Transmission Line with 100°C 795 ACSR.	2021	**$16,080,000**
SBAA TOTAL ($2018)			**$16,080,000** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Diagram I.9.1. Approximate Location of Potential Solutions – *SBAA*



Economic Planning Study Additional Interchange Assumptions – *SBAA*

The following tables below list any interface reservations that were preserved in the economic planning studies in addition to those modeled in the Version 2 SERTP Models.

Table II.9.4. Additional Transactions

OASIS Ref. #	POR	POD	Amount (MW)
82974296	SC	SOCO	50
82974306 & 82974307	MISO	SMEPA load on SOCO	80
80832875	SOCO	DUKE	60
80832879	SOCO	DUKE	1
80832887	SOCO	DUKE	27
80832892	SOCO	DUKE	132
80832880	SOCO	DUKE	10

Table II.9.5. Capacity Benefit Margin (CBM)

SERTP Sponsor	Interface	Amount (MW)
Southern	Duke	350
Southern	TVA	300
Southern	MISO	100
Southern	SCPSA	50

Table II.9.6. Transmission Reliability Margin (TRM)

SERTP Sponsor	Interface	Amount (MW)
Southern	Import from Duke	168
GTC	Import from Duke	103
MEAG	Import from Duke	22
Dalton	Import from Duke	3
Southern	Import from MISO	188
Southern	Import from TVA	279
GTC	Import from TVA	71
MEAG	Import from TVA	16
Dalton	Import from TVA	2

Tennessee Valley Authority Balancing Authority Area (TVA) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Southern BAA to Santee Cooper	1000 MW	Southern BAA	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table I.10.1. Pass 0 – Transmission System Impacts with No Enhancements – *TVA*

The following table identifies significant ***TVA*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
TVA	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.10.2. Pass 1 – Potential Future Transmission System Impacts – *TVA*

The following table depicts thermal loadings of ***TVA*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
TVA	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table I.10.3. Potential Solutions for Identified Problems – *TVA*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
TVA TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

II. Study Request 2 Results

Santee Cooper to Duke Energy

2021

1000 MW

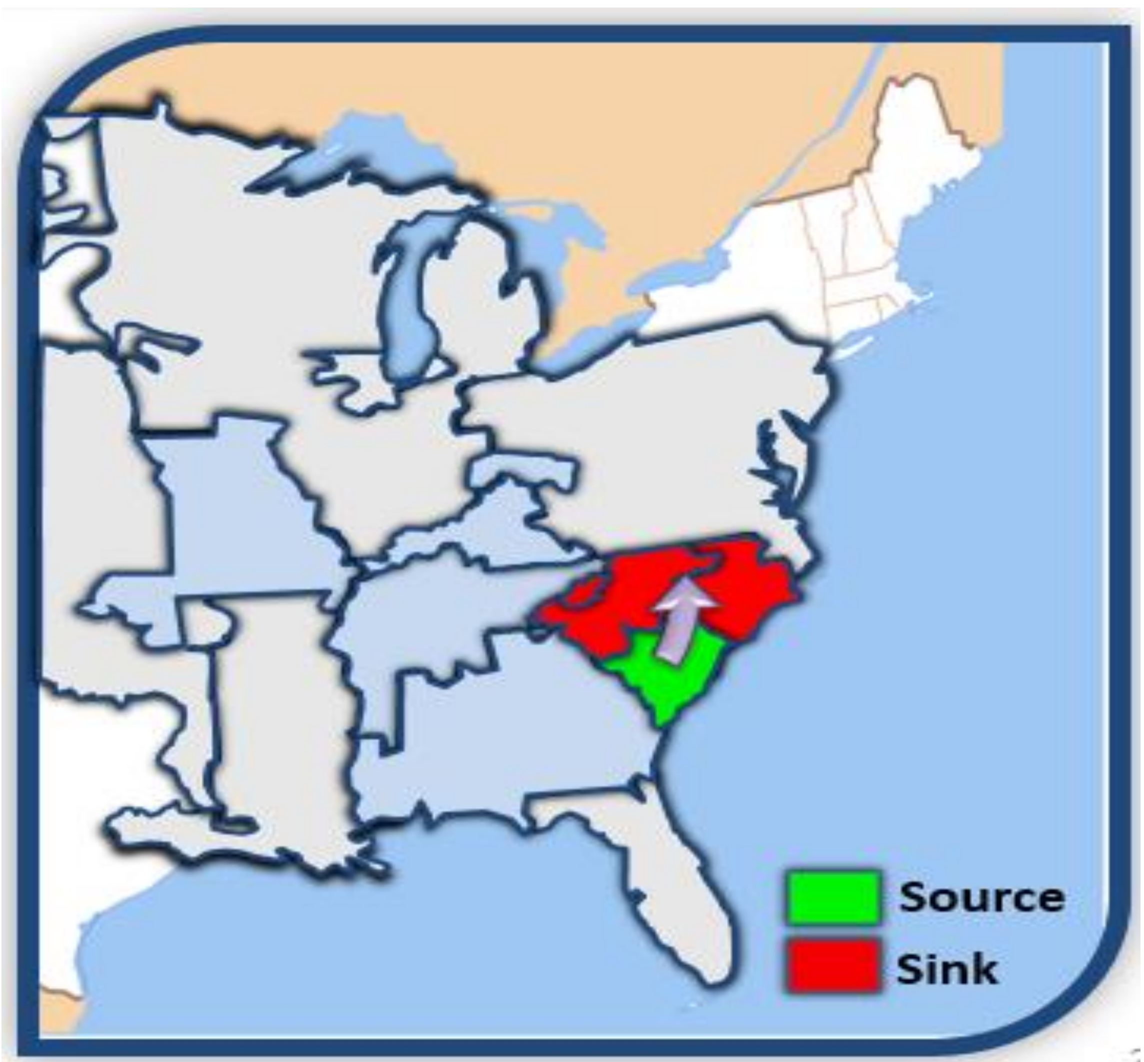
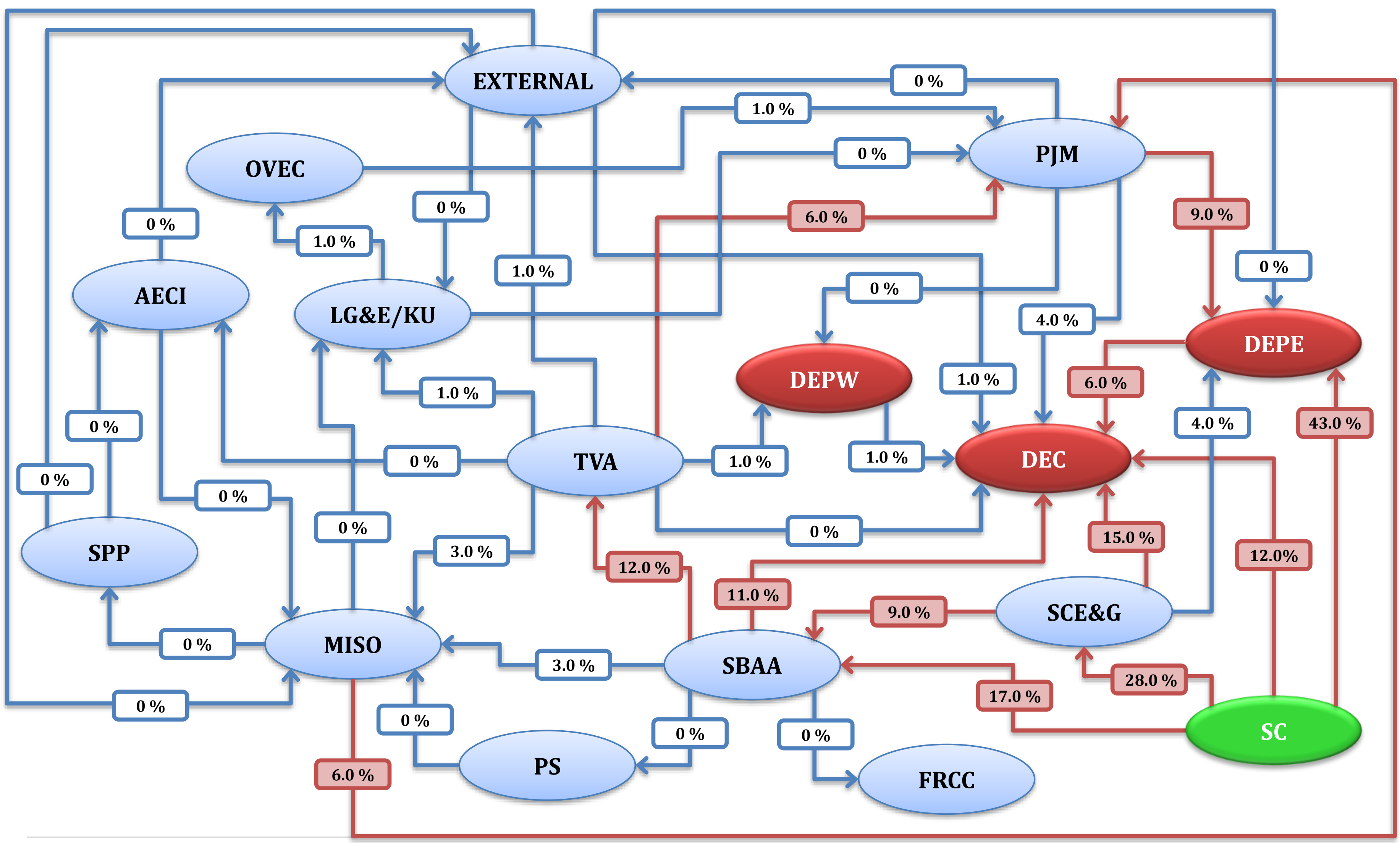


Table II.1.1. Total Cost Identified by the SERTP Sponsors

Balancing Authority Area	Planning Level Cost Estimate
Associated Electric Cooperative (AECI)	$0
Duke Carolinas (DEC)	$32,800,000
Duke Progress East (DEPE)	$25,000,000
Duke Progress West (DEPW)	$0
Louisville Gas & Electric and Kentucky Utilities (LG&E/KU)	$0
Ohio Valley Electric Corporation (OVEC)	$0
PowerSouth (PS)	$0
Southern (SBAA)	$0
Tennessee Valley Authority (TVA)	$0
TOTAL ($2018)	**$57,800,000**

<u>Diagram II.1.1.</u> Transfer Flow Diagram (% of Total Transfer)



Associated Electric Cooperative Balancing Authority Area (AECI) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.2.1. Pass 0 – Transmission System Impacts with No Enhancements – *AECI*

The following table identifies significant ***AECI*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
AECI	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.2.2. Pass 1 – Potential Future Transmission System Impacts – *AECI*

The following table depicts thermal loadings of ***AECI*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
AECI	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.2.3. Potential Solutions for Identified Problems – *AECI*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
AECI TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Duke Carolinas Balancing Authority Area (DEC) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.3.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEC*

The following table identifies significant ***DEC*** thermal constraints without any enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
DEC	Lee Steam – Shady Grove Tie 100kV T.L.	120	94.3	100.5	Shady Grove Tie Bus Contingency	1	P1

Scenario Explanations:

1. System Normal, Summer Peak Case

Table II.3.2. Pass 1 – Potential Future Transmission System Impacts – *DEC*

The following table depicts thermal loadings of ***DEC*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
DEC	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

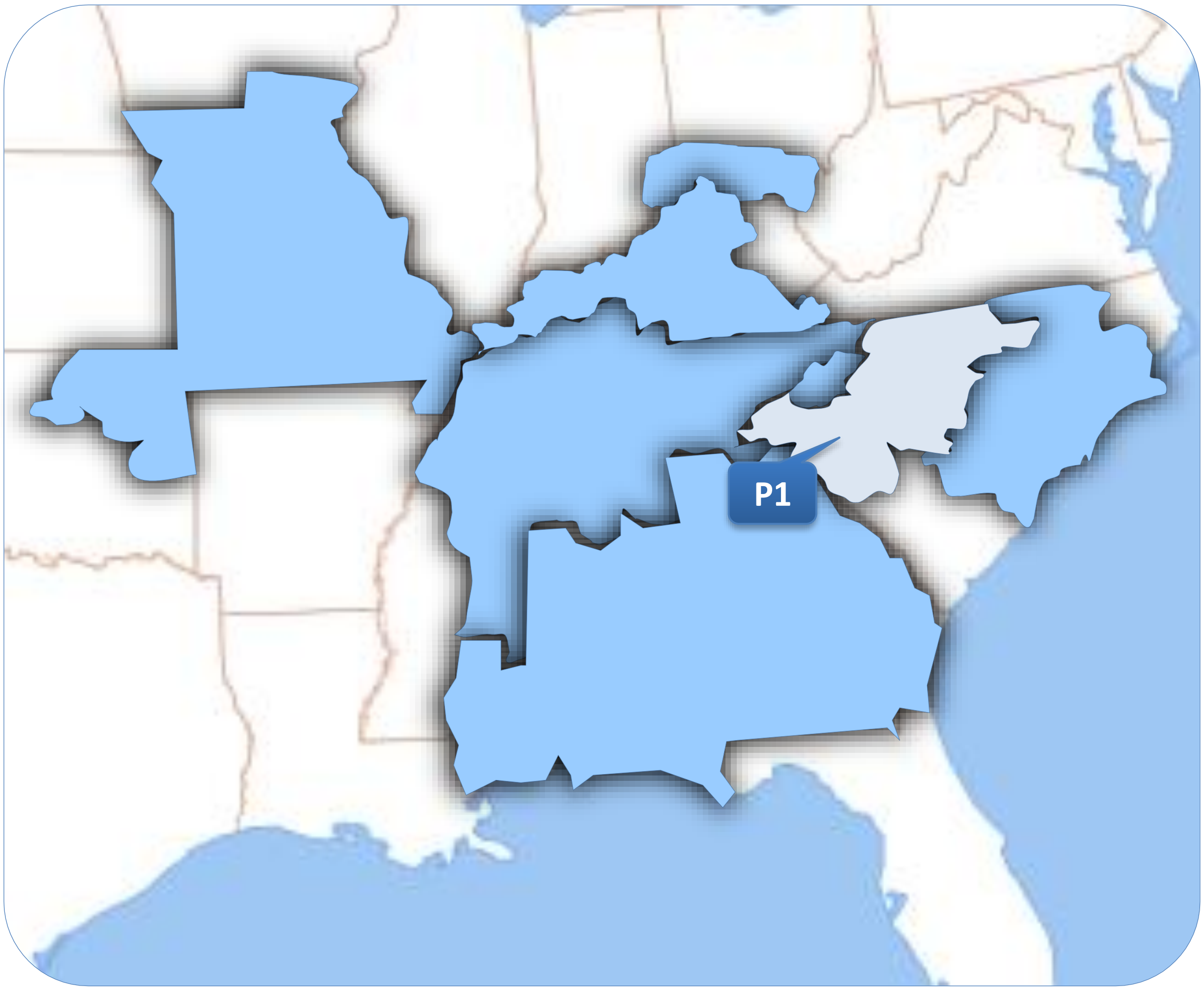
Table II.3.3. Potential Solutions for Identified Problems – *DEC*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
P1	Rebuild both double circuit 100kV transmission lines between Lee Steam and Shady Grove Tie (total of 20.5 miles) with 1158 ACSS/tw conductor	2021	$32,800,000
DEC TOTAL ($2018)			**$32,800,000**(1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Diagram II.3.1. Approximate Location of Potential Solutions – *DEC*



Duke Progress East Balancing Authority Area (DEPE) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.4.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEPE*

The following table identifies significant ***DEPE*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
DEPE	304716 CAMDEN TAP 115 304725 CAMDEN115 TT 115 1	107	96.3	104.5	304725 CAMDEN 115 TT 115 304731 CAMD IND TT 115 1	1	P1
DEPE	304725 CAMDEN115 TT 115 304731 CAMD IND TT 115 1	107	94.5	102.3	304716 CAMDEN TAP 115 304725 CAMDEN115 TT 115 1	1	P1

Scenario Explanations:

1. Robinson Unit 2 Offline, Summer Peak Case

Table II.4.2. **Pass 1 – Potential Future Transmission System Impacts – *DEPE***

The following table depicts thermal loadings of ***DEPE*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
DEPE	304716 CAMDEN TAP 115 304724 CAMDEN CITY 115 1	107	<85	90.8	304716 CAMDEN TAP 115 304725 CAMDEN115 TT 115 1	1	--
DEPE	304632 MARION115 TT 115 304653 DILLON TAP 115 1	97	<85	97.3	304663 LATTA SS TT 230 304682 DILLONMP TAP 230 1	2	--

Scenario Explanations:

1. Robinson Unit 2 Offline, Summer Peak Case
2. Brunswick Unit 1 Offline, Summer Peak Case

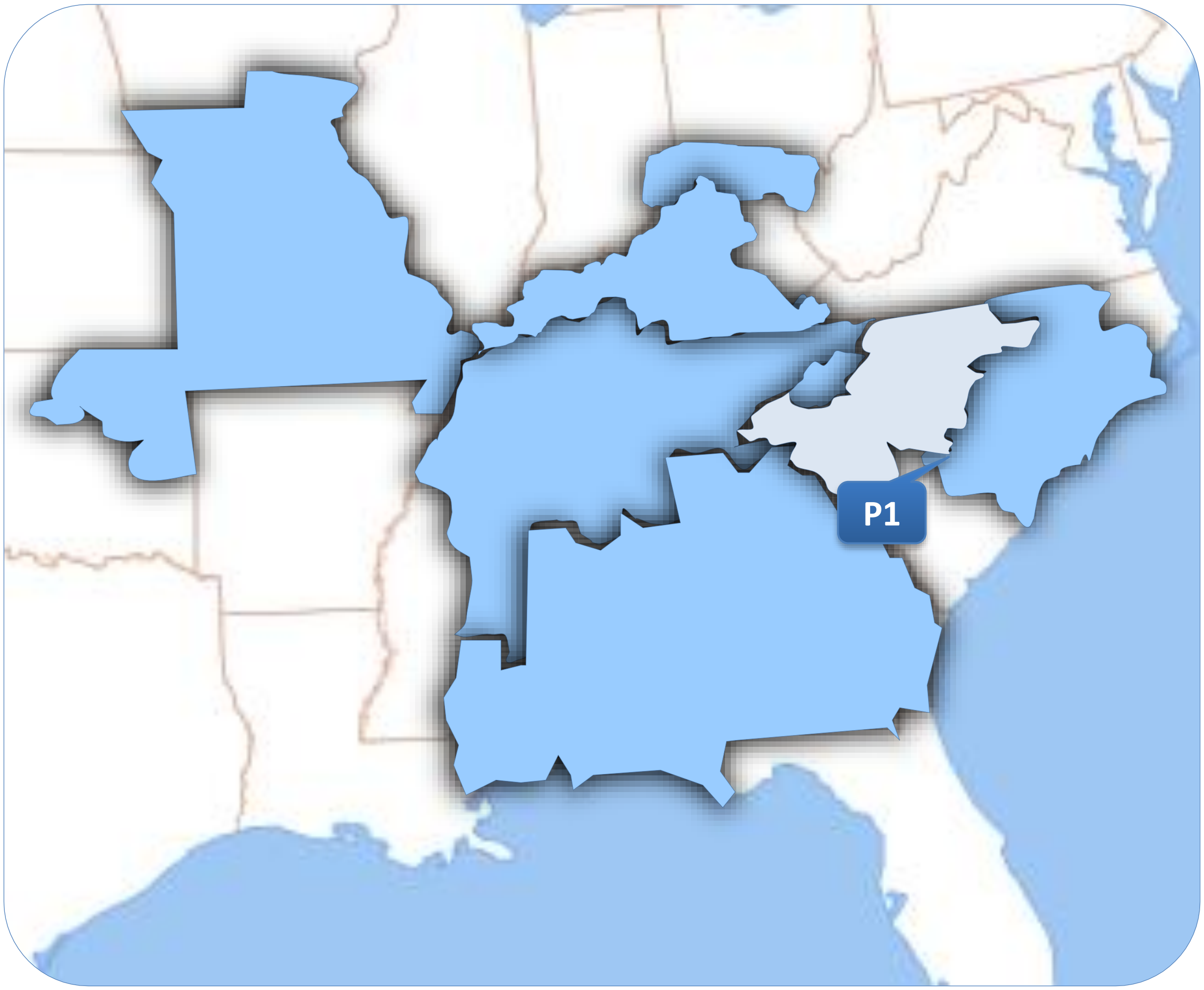
Table II.4.3. Potential Solutions for Identified Problems – *DEPE*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
P1	**Upgrade Camden Junction 115kV Switching Station to 230kV Substation, Construct Camden Junction-(SCPSA) Camden 230kV Line**	2021	$25,000,000
DEPE TOTAL ($2018)			**$25,000,000** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Diagram II.4.1. **Approximate Location of Potential Solutions - DEPE**



Duke Progress West (DEPW) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.5.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEPW*

The following table identifies significant ***DEPW*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
DEPW	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.5.2. Pass 1 – Potential Future Transmission System Impacts – *DEPW*

The following table depicts thermal loadings of ***DEPW*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
DEPW	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.5.3. Potential Solutions for Identified Problems – *DEPW*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	$0
DEPW TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Louisville Gas & Electric and Kentucky Utilities Balancing Authority Area (LG&E/KU) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.6.1. Pass 0 – Transmission System Impacts with No Enhancements – *LG&E/KU*

The following table identifies significant ***LG&E/KU*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
LG&E/KU	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

<u>Table II.6.2.</u> Pass 1 – Potential Future Transmission System Impacts – *LG&E/KU*

The following table depicts thermal loadings of ***LG&E/KU*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
LG&E/KU	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.6.3. Potential Solutions for Identified Problems – *LG&E/KU*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	None Required	--	--
LG&E/KU TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Ohio Valley Electric Corporation Balancing Authority Area (OVEC) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.7.1. Pass 0 – Transmission System Impacts with No Enhancements – *OVEC*

The following table identifies significant ***OVEC*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
OVEC	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.7.2. Pass 1 – Potential Future Transmission System Impacts – *OVEC*

The following table depicts thermal loadings of ***OVEC*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
OVEC	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.7.3. Potential Solutions for Identified Problems – *OVEC*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
OVEC TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

PowerSouth Balancing Authority Area (PS) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.8.1. Pass 0 – Transmission System Impacts with No Enhancements – *PS*

The following table identifies significant ***PS*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
PS	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.8.2. Pass 1 – Potential Future Transmission System Impacts – *PS*

The following table depicts thermal loadings of ***PS*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
PS	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.8.3. Potential Solutions for Identified Problems – *PS*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
PS TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Southern Balancing Authority Area (SBAA) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.9.1. Pass 0 – Transmission System Impacts with No Enhancements – *SBAA*

The following table identifies significant ***SBAA*** thermal constraints without any enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
SBAA	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.9.2. Pass 1 – Potential Future Transmission System Impacts – *SBAA*

The following table depicts thermal loadings of ***SBAA*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
SBAA	380153 3ROBINS SP 115 - 380828 3DEEPSTEP 115	63	92.6	98.1	380013 8BONAIRE 500 - 380150 6BONAIRE LS 230	1	--
SBAA	380828 3DEEPSTEP 115 - 382312 3STEMBRIDGE 115	63	86.5	92	380013 8BONAIRE 500 - 380150 6BONAIRE LS 230	1	--

Scenario Explanations:

1. Mid Georgia Cogen Offline, Shoulder (93% Load Level) Case

Table II.9.3. Potential Solutions for Identified Problems – *SBAA*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
SBAA TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Tennessee Valley Authority Balancing Authority Area (TVA) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Santee Cooper to Duke	1000 MW	Santee Cooper	Duke Energy Carolinas Duke Energy Progress	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table II.10.1. Pass 0 – Transmission System Impacts with No Enhancements – *TVA*

The following table identifies significant ***TVA*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
TVA	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.10.2. Pass 1 – Potential Future Transmission System Impacts – *TVA*

The following table depicts thermal loadings of ***TVA*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
TVA	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table II.10.3. Potential Solutions for Identified Problems – *TVA*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
TVA TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

III. Study Request 3 Results

Duke Energy to Santee Cooper

2021

1000 MW

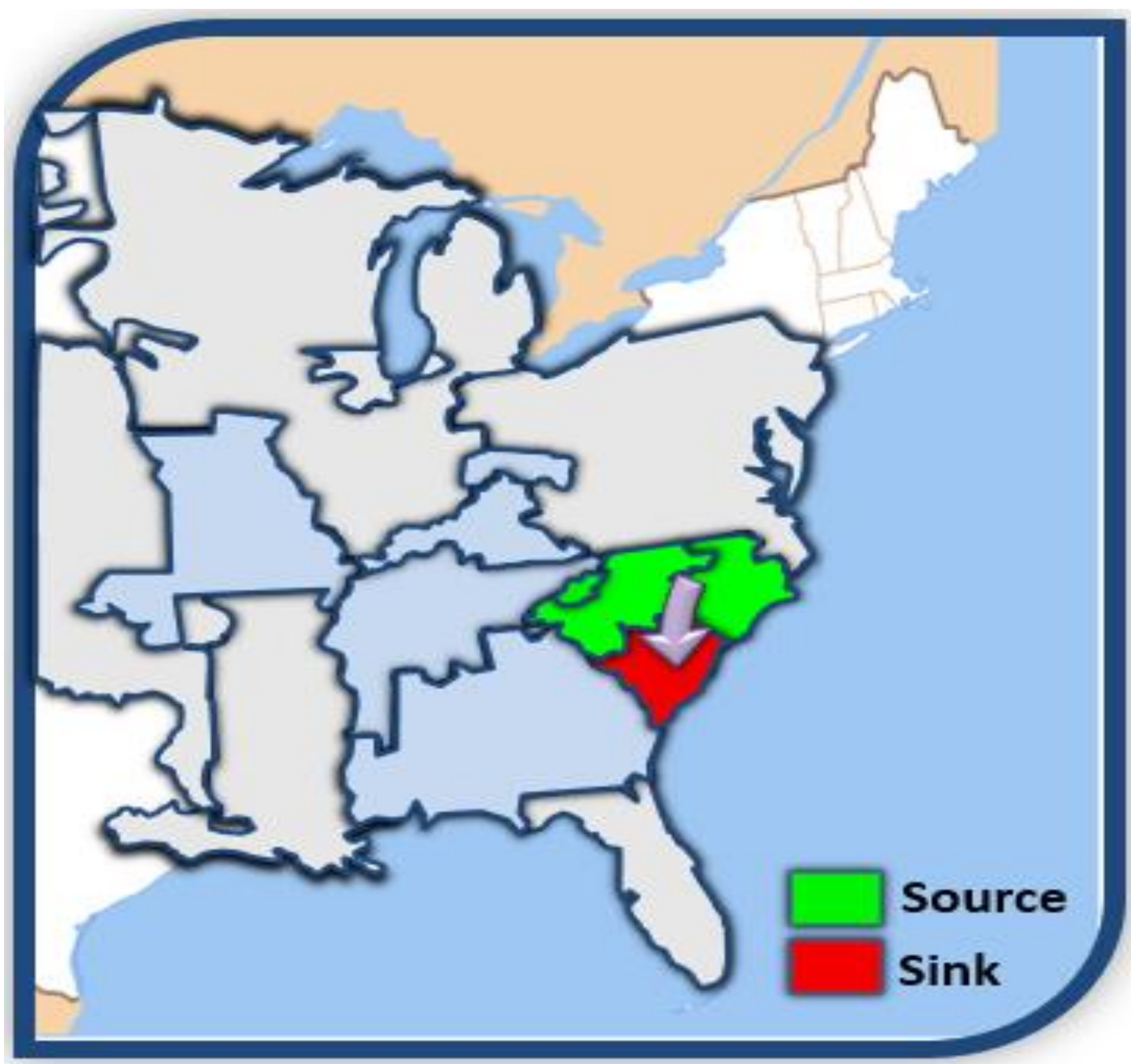
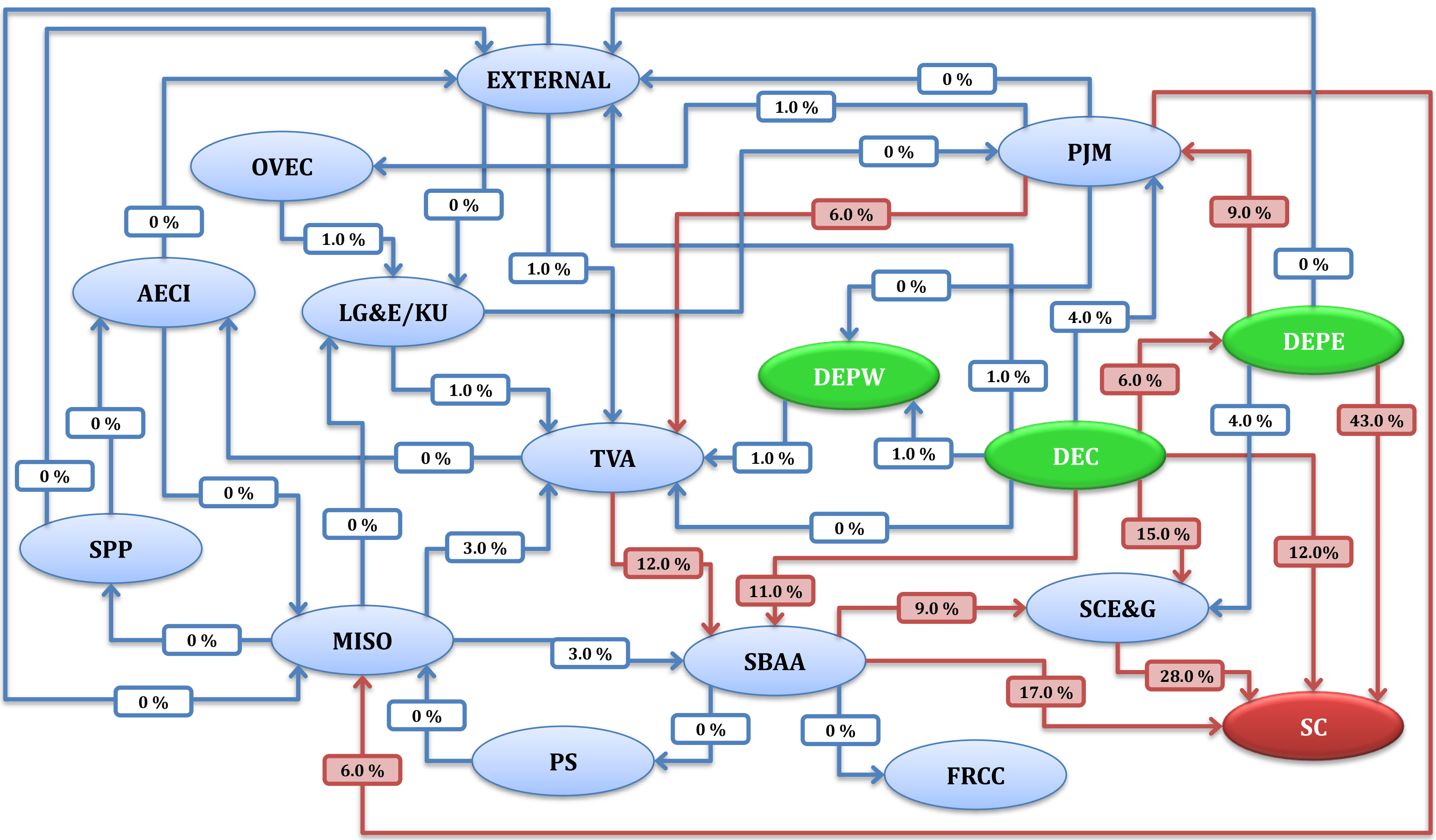


Table III.1.1. **Total Cost Identified by the SERTP Sponsors**

Balancing Authority Area	Planning Level Cost Estimate
Associated Electric Cooperative (AECI)	$0
Duke Carolinas (DEC)	$26,400,000
Duke Progress East (DEPE)	$0
Duke Progress West (DEPW)	$0
Louisville Gas & Electric and Kentucky Utilities (LG&E/KU)	$0
Ohio Valley Electric Corporation (OVEC)	$0
PowerSouth (PS)	$0
Southern (SBAA)	$16,080,000
Tennessee Valley Authority (TVA)	$0
TOTAL ($2018)	**$42,480,000**

Diagram III.1.1. **Transfer Flow Diagram (% of Total Transfer)**



Associated Electric Cooperative Balancing Authority Area (AECI) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.2.1. Pass 0 – Transmission System Impacts with No Enhancements – *AECI*

The following table identifies significant ***AECI*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
AECI	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.2.2. Pass 1 – Potential Future Transmission System Impacts – *AECI*

The following table depicts thermal loadings of ***AECI*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
AECI	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.2.3. Potential Solutions for Identified Problems – *AECI*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
AECI TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Duke Carolinas Balancing Authority Area (DEC) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.3.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEC*

The following table identifies significant ***DEC*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
DEC	Hodges Tie – Coronaca Tie 100kV T.L.	129	115.1	133.8	Loss of parallel Hodgest Tie – Coronaca 100kV T.L.	1	P1
DEC	Laurens Tie – Bush River Tie 100kV T.L.	65	80.2	101.9	Santee Cooper – Newberry – Greenwood 230kV T.L.	2	P2, P3

Scenario Explanations:

1. System Normal, Summer Peak Case
2. VC Summer Unit 1 Offline, Summer Peak Case

Table III.3.2. Pass 1 – Potential Future Transmission System Impacts – *DEC*

The following table depicts thermal loadings of ***DEC*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
DEC	Lawsons Fork Tie – West Spartanburg Tie 100kV T.L.	129	91.7	97.4	Tiger Tie 230kV Bus Junction Breaker Failure	1	--
DEC	Bush River Tie – Georgia Pacific Tap (SCEG) 115kV T.L.	79	72.6	95.2	Santee Cooper – Newberry – Greenwood 230kV T.L.	2	--

Scenario Explanations:

1. System Normal, Summer Peak Case
2. VC Summer Unit 1 Offline, summer Peak Case

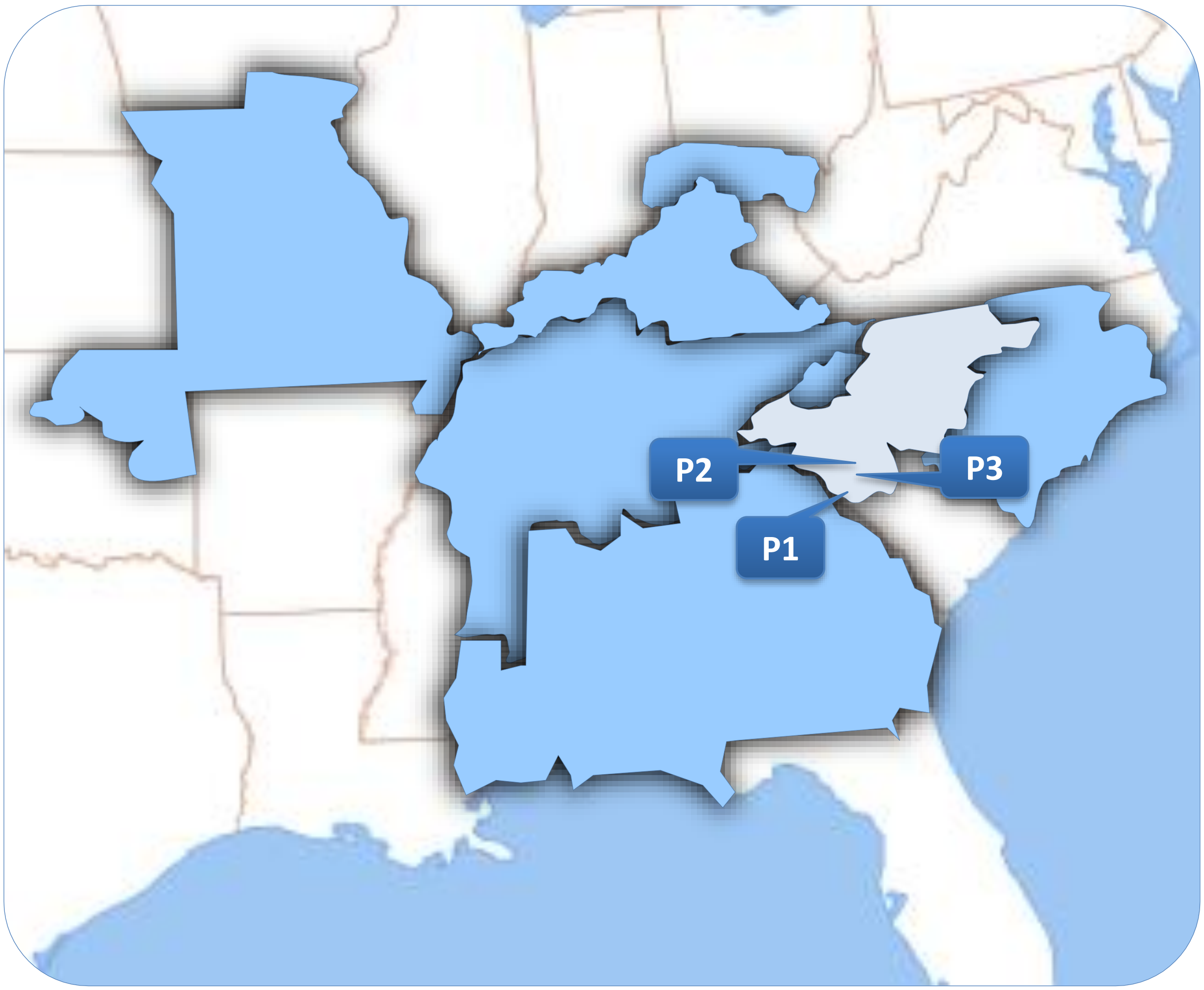
Table III.3.3. Potential Solutions for Identified Problems – *DEC*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
1	Rebuild Hodges Tie – Coronaca Tie 100kV double circuit transmission line with 954 ACSR conductors. Total line distance is 9.2 miles.	2021	$12,700,000
2	Install a 28.8 MVAR capacitor bank at Laurens Tie.	2021	$900,000
3	Rebuild approximately 8.0 miles of Laurens Tie – Bush River Tie 100kV double circuit transmission line with 954 ACSR conductors.	2021	$12,800,000
DEC TOTAL ($2018)			**$26,400,000** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Diagram III.3.1. **Approximate Location of Potential Solutions – *DEC***



Duke Progress East Balancing Authority Area (DEPE) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.4.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEPE*

The following table identifies significant ***DEPE*** thermal constraints without any enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	Limiting Element	Rating (MVA)	Without Request	With Request	Contingency	Scenario	Project
DEPE	None Identified	–	–	–	–	–	–

Scenario Explanations:

1. N/A

Table III.4.2. Pass 1 – Potential Future Transmission System Impacts – *DEPE*

The following table depicts thermal loadings of ***DEPE*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
DEPE	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.4.3. Potential Solutions for Identified Problems – *DEPE*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
DEPE TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Duke Progress West (DEPW) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.5.1. Pass 0 – Transmission System Impacts with No Enhancements – *DEPW*

The following table identifies significant ***DEPW*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
DEPW	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.5.2. Pass 1 – Potential Future Transmission System Impacts – *DEPW*

The following table depicts thermal loadings of ***DEPW*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
DEPW	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.5.3. Potential Solutions for Identified Problems – *DEPW*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	$0
DEPW TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Louisville Gas & Electric and Kentucky Utilities Balancing Authority Area (LG&E/KU) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.6.1. Pass 0 – Transmission System Impacts with No Enhancements – *LG&E/KU*

The following table identifies significant ***LG&E/KU*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
LG&E/KU	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.6.2. Pass 1 – Potential Future Transmission System Impacts – *LG&E/KU*

The following table depicts thermal loadings of ***LG&E/KU*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
LG&E/KU	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.6.3. Potential Solutions for Identified Problems – *LG&E/KU*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
LG&E/KU TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Ohio Valley Electric Corporation Balancing Authority Area (OVEC) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.7.1. Pass 0 – Transmission System Impacts with No Enhancements – *OVEC*

The following table identifies significant ***OVEC*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
OVEC	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.7.2. Pass 1 – Potential Future Transmission System Impacts – *OVEC*

The following table depicts thermal loadings of ***OVEC*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%)		Contingency	Scenario	Project
			Without Request	With Request			
OVEC	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.7.3. Potential Solutions for Identified Problems – *OVEC*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
OVEC TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

PowerSouth Balancing Authority Area (PS) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.8.1. Pass 0 – Transmission System Impacts with No Enhancements – *PS*

The following table identifies significant ***PS*** thermal constraints without any enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
PS	None Identified	–	–	–	–	–	–

Scenario Explanations:

1. N/A

Table III.8.2. Pass 1 – Potential Future Transmission System Impacts – *PS*

The following table depicts thermal loadings of ***PS*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
PS	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

Table III.8.3. Potential Solutions for Identified Problems – *PS*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
	PS TOTAL ($2018)		**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

Southern Balancing Authority Area (SBAA) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.9.1. Pass 0 – Transmission System Impacts with No Enhancements – *SBAA*

The following table identifies significant ***SBAA*** thermal constraints without any enhancements to the transmission system.

			Thermal Loadings (%)				
AREA	**Limiting Element**	**Rating (MVA)**	**Without Request**	**With Request**	**Contingency**	**Scenario**	**Project**
SBAA	381093 3OFFERMAN 115 - 381434 3OFF CHIP 115	91	98.5	104.1	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	1	1
SBAA	380263 3SATILLA CK 115 - 381434 3OFF CHIP 115	91	98.3	104.0	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	1	1
SBAA	380263 3SATILLA CK 115 - 381094 3SCREVEN 115	91	96.3	101.9	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	1	1

Scenario Explanations:

1. McIntosh Unit #10 Offline, Summer Peak Case

Table III.9.2. Pass 1 – Potential Future Transmission System Impacts – *SBAA*

The following table depicts thermal loadings of ***SBAA*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
SBAA	381094 3SCREVEN 115 - 381095 3JESUP 115	91	87.8	93.7	380847 3BAXLEY 115 - 381098 3BRENTWOOD 115	1	--
SBAA	381448 3METTER 115 - 383103 3LIVE OAK 115	79	90.5	95.8	380008 8VOGTLE B3-4 500 - 382113 8S_VOG_W MAC 500	1	--
SBAA	382102 6HATCH SS 2 230 - 382361 6VIDALIA B2 230 1	509	82.4	92.4	380018 8SCHERER 500 - 383052 8WARTHEN 500 1	2	--
SBAA	380160 6HATCH 230 - 382102 6HATCH SS 2 230 1	509	84	92.3	380018 8SCHERER 500 - 383052 8WARTHEN 500 1	2	--

Scenario Explanations:

1. McIntosh Unit #10 Offline, Summer Peak Case
2. Vogtle Unit #1 Offline, Summer Peak Case

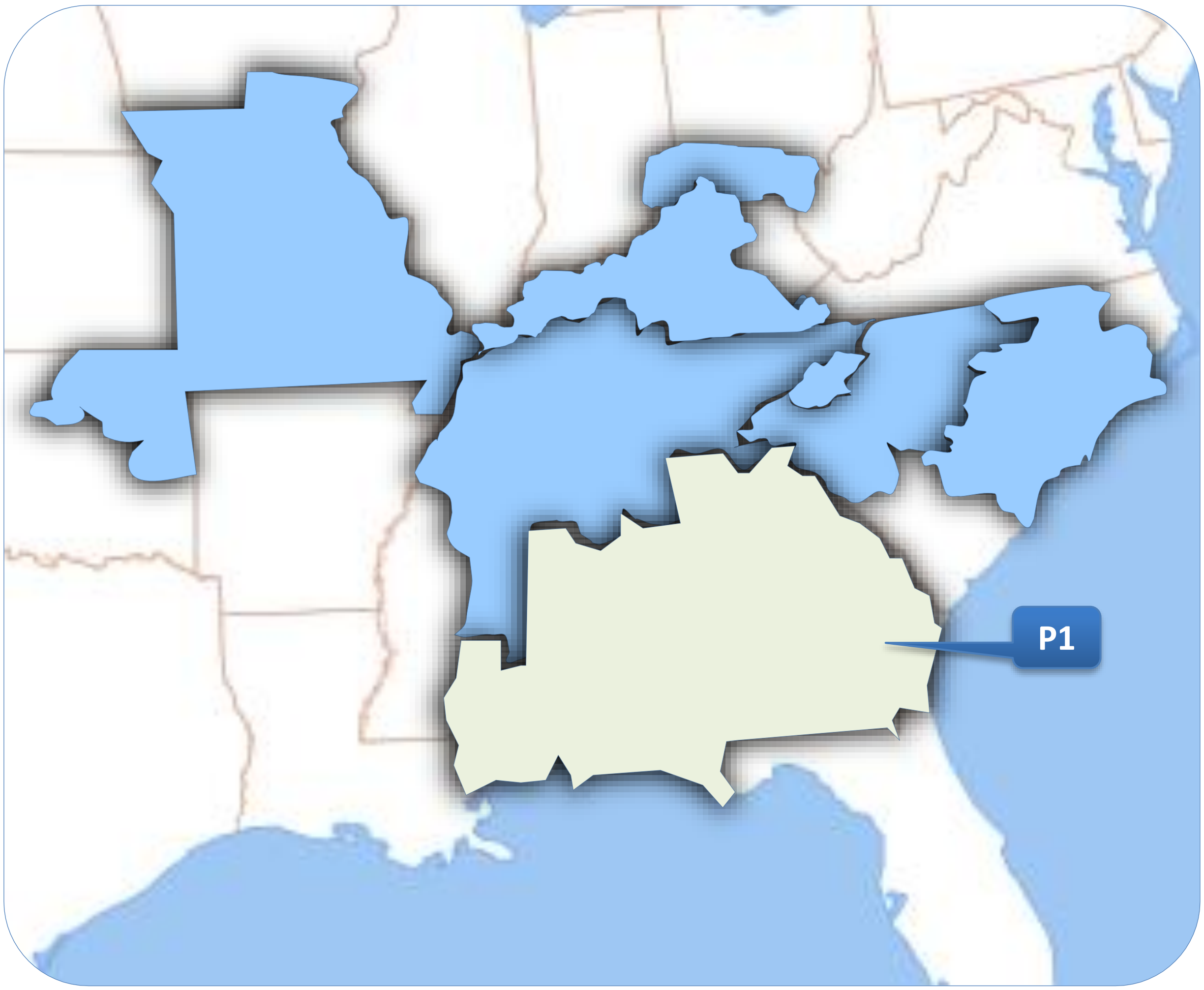
Table III.9.3. Potential Solutions for Identified Problems – *SBAA*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
P1	**OFFERMAN – JESUP 115kV Transmission Line Rebuild** • Rebuild approximately 20.1 miles of the Offerman – Jesup 115kV Transmission Line with 100^{o}C 795 ACSR	2021	**$16,080,000**
SBAA TOTAL ($2018)			**$16,080,000** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.

<u>Diagram III.9.1.</u> Approximate Location of Potential Solutions – *SBAA*



Economic Planning Study Additional Interchange Assumptions – *SBAA*

The following tables below list any interface reservations that were preserved in the economic planning studies in addition to those modeled in the Version 2 SERTP Models.

Table II.9.4. Additional Transactions

OASIS Ref. #	POR	POD	Amount (MW)
82974296	SC	SOCO	50
82974306 & 82974307	MISO	SMEPA load on SOCO	80
80832875	SOCO	DUKE	60
80832879	SOCO	DUKE	1
80832887	SOCO	DUKE	27
80832892	SOCO	DUKE	132
80832880	SOCO	DUKE	10

Table II.9.5. Capacity Benefit Margin (CBM)

SERTP Sponsor	Interface	Amount (MW)
Southern	Duke	350
Southern	TVA	300
Southern	MISO	100
Southern	SCPSA	50

Table II.9.6. Transmission Reliability Margin (TRM)

SERTP Sponsor	Interface	Amount (MW)
Southern	Import from Duke	168
GTC	Import from Duke	103
MEAG	Import from Duke	22
Dalton	Import from Duke	3
Southern	Import from MISO	188
Southern	Import from TVA	279
GTC	Import from TVA	71
MEAG	Import from TVA	16
Dalton	Import from TVA	2

Tennessee Valley Authority Balancing Authority Area (TVA) Results

Study Structure and Assumptions

Transfer Sensitivity	Amount	Source	Sink	Year
Duke to Santee Cooper	1000 MW	Duke Energy Progress Duke Energy Carolinas	Santee Cooper	2021
Load Flow Cases				
2018 Series Version 2 SERTP Models: Summer Peak				

Transmission System Impacts

The following tables below identify any constraints attributable to the requested transfer for the contingency and scenario that resulted in the most significant loadings for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

Table III.10.1. Pass 0 – Transmission System Impacts with No Enhancements – *TVA*

The following table identifies significant ***TVA*** thermal constraints without any enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	With Request	Contingency	Scenario	Project
TVA	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

<u>Table III.10.2.</u> Pass 1 – Potential Future Transmission System Impacts – *TVA*

The following table depicts thermal loadings of ***TVA*** transmission facilities that could become potential constraints in future years or with different queuing assumptions but are not overloaded in the study year with all proposed enhancements to the transmission system.

AREA	Limiting Element	Rating (MVA)	Thermal Loadings (%) Without Request	Thermal Loadings (%) With Request	Contingency	Scenario	Project
TVA	None Identified	--	--	--	--	--	--

Scenario Explanations:

1. N/A

<u>Table III.10.3.</u> Potential Solutions for Identified Problems – *TVA*

The following table lists any potential solutions that were identified to address the attributable constraints based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur and would impact the results of this study. In addition, the currently projected improvements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission expansion plans could also impact the results of this study.

Item	Potential Solution	Estimated Need Date	Planning Level Cost Estimate
--	**None Required**	--	--
TVA TOTAL ($2018)			**$0** (1)

(1) Total planning level cost estimate does not include the cost of projects that are included in SERTP Sponsors' expansion plans and are scheduled to be completed by June 1st of the study year. The studied transfer depends on these projects being in-service, and the cost to support the study transfer could be greater than the total shown above if any of these projects are delayed or cancelled.