Southeastern Regional
TRANSMISSION PLANNING

2018 SERTP

SERTP – 3rd Quarter Meeting

2nd RPSG Meeting

September 18th, 2018

Web Conference

Process Information

- The SERTP process is a transmission planning process.

- Please contact the respective transmission provider for questions related to real-time operations or OATT transmission service.

Purposes & Goals of Meeting

- **Economic Planning Studies**
  - Preliminary Results
  - Stakeholder Input/Discussion
- **Miscellaneous Updates**
- **Next Meeting Activities**

SERTP Preliminary

Economic Planning Studies

Economic Planning Studies

Economic Planning Studies Process

- Economic Planning Studies were chosen by the Regional Planning Stakeholder Group "RPSG" in March at the 2018 SERTP 1st Quarter Meeting.

- Key study criteria, methodologies, and input assumptions were finalized in May.

- These studies represent analyses of hypothetical scenarios requested by the stakeholders and **do not** represent an actual transmission need or commitment to build.

Economic Planning Studies

Economic Planning Studies Process

- **SERTP Sponsors identify the transmission requirements needed to move large amounts of power above and beyond existing long-term, firm transmission service commitments**
  - Analysis are consistent with NERC standards and company-specific planning criteria

- **Models used to perform the analysis incorporate the load forecasts and resource decisions as provided by LSEs**
  - Power flow models are made available to stakeholders to perform additional screens or analysis

Economic Planning Studies

Economic Planning Studies

- **Southern BAA to Santee Cooper Border**
  - 1000 MW (2021 Summer Peak)
- **Santee Cooper Border to Duke Energy Carolinas and Duke Energy Progress**
  - 1000 MW (2021 Summer Peak)
- **Duke Energy Carolinas and Duke Energy Progress to Santee Cooper Border**
  - 1000 MW (2021 Summer Peak)

Economic Planning Studies

Power Flow Cases Utilized

- **Study Years:**
  - 2021

- **Load Flow Cases:**
  - 2018 Series Version 2 SERTP Regional Models
  - Summer Peak
    - Additional load levels evaluated as appropriate

Economic Planning Studies

Preliminary Report Components

- **The SERTP reported, at a minimum, results on elements of 115 kV and greater:**
  - Thermal loadings greater than 90% for facilities that are negatively (+5%) impacted by the proposed transfers
  - Voltages appropriate to each participating transmission owner's planning criteria
  - Overloaded facilities that had a low response to the requested transfer were excluded and issues identified that are local in nature were also excluded

- **For each economic planning study request, the results of that study include:**
  1. Limit(s) to the transfer
  2. Potential transmission enhancement(s) to address the limit(s)
  3. Planning-level cost estimates and in-service dates for the selected transmission enhancement(s)

Economic Planning Studies

Process Information

- The following information depicts recommended enhancements for the proposed transfer levels above and beyond existing, firm commitments. Therefore, this information does not represent a commitment to proceed with the recommended enhancements nor implies that the recommended enhancements could be implemented by the study dates (2021).

- These potential solutions only address constraints identified within the SERTP Sponsors' areas that are associated with the proposed transfers. Other Balancing Areas were not monitored which could result in additional limitations and required system enhancements.

Economic Planning Studies

Economic Planning Studies – Preliminary Results

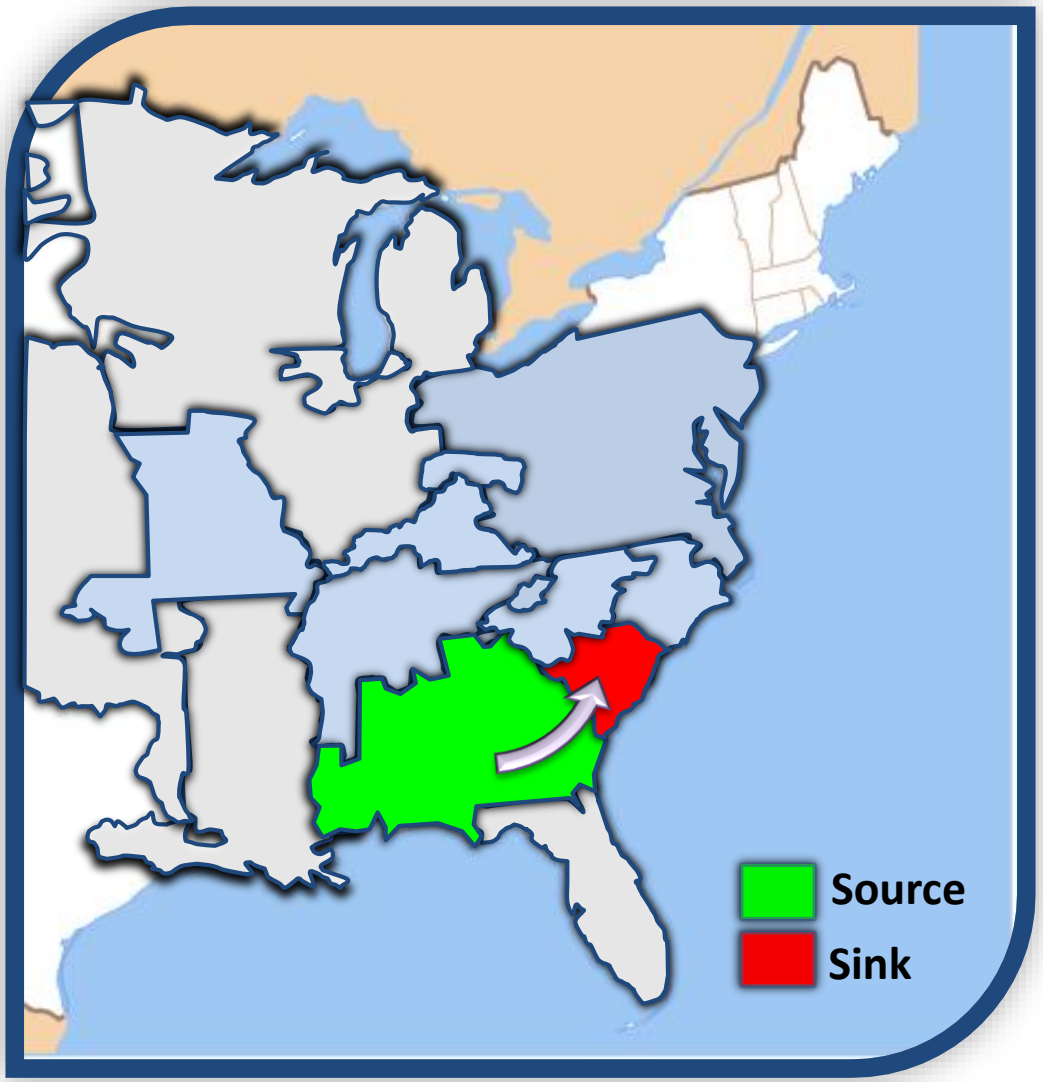
Southern BAA to Santee Cooper Border
1000 MW

Southeastern Regional TRANSMISSION PLANNING

Southern BAA to Santee Cooper – 1000 MW

Study Assumptions

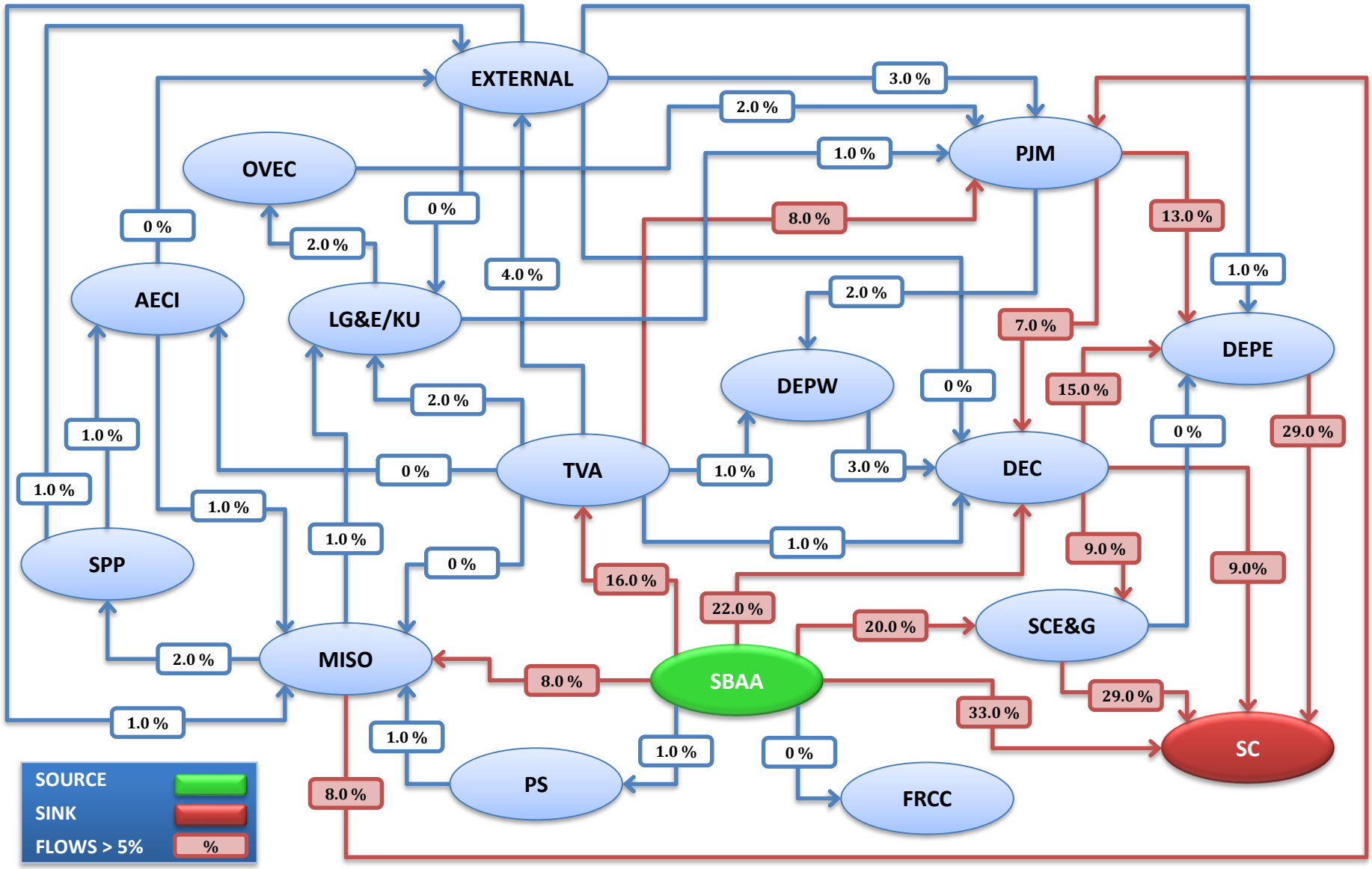
- **Transfer Type:** Generation to Load (2021 Summer Peak)
- **Source:** Generation within Southern BAA
- **Sink:** Uniform load scale within Santee Cooper



Southeastern Regional
TRANSMISSION PLANNING

Southern BAA to Santee Cooper – 1000 MW

Transfer Flow Diagram (% of Total Transfer)



Southern BAA to Santee Cooper – 1000 MW

Transmission System Impacts

- **Transmission System Impacts Identified:**
  - Significant constraints were identified in the following SERTP Balancing Authority Areas:
    - ***DEC***
    - ***SBAA***

- **Potential Transmission Enhancements Identified:**
  - (DEC) Two (2) 100kV Transmission Line Upgrades
  - (DEC) One (1) Capacitor Bank Installation
  - (SBAA) One (1) 115kV Transmission Line Upgrade

SERTP TOTAL ($2018) = $42,480,000

Southern BAA to Santee Cooper – 1000 MW

Significant Constraints Identified – *DEC*

Table 1: Significant Constraints - DEC

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Hodges Tie – Coronaca Tie 100kV T.L.	129	115.1	133.8
P2, P3	Laurens Tie – Bush River Tie 100kV T.L.	65	80.2	101.9

Southern BAA to Santee Cooper – 1000 MW

Potential Enhancements Identified – *DEC*

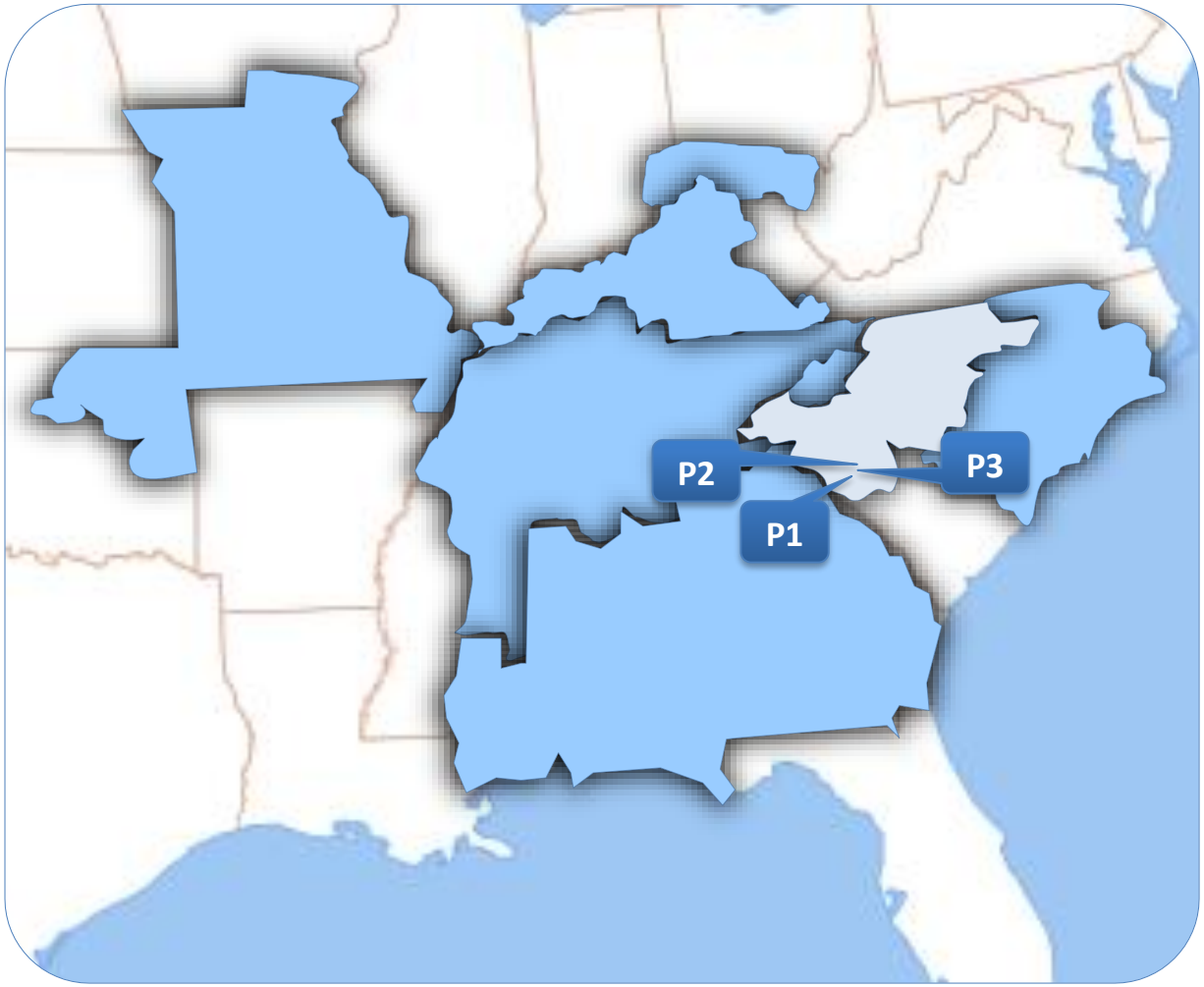
Table 2: Potential Enhancements - DEC

Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Hodges Tie – Coronaca Tie 100kV double circuit** T.L. • Rebuild the entire 9.2 mile Hodges Tie – Coronaca Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C	**$12,700,000**
P2	**Laurens Tie** • Install a 28.8 MVAR capacitor bank at Laurens Tie	**$900,000**
P3	**Laurens Tie – Bush River Tie 100kV double circuit T.L.** • Rebuild approximately 8.0 miles of Laurens Tie – Bush River Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C.	**$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.

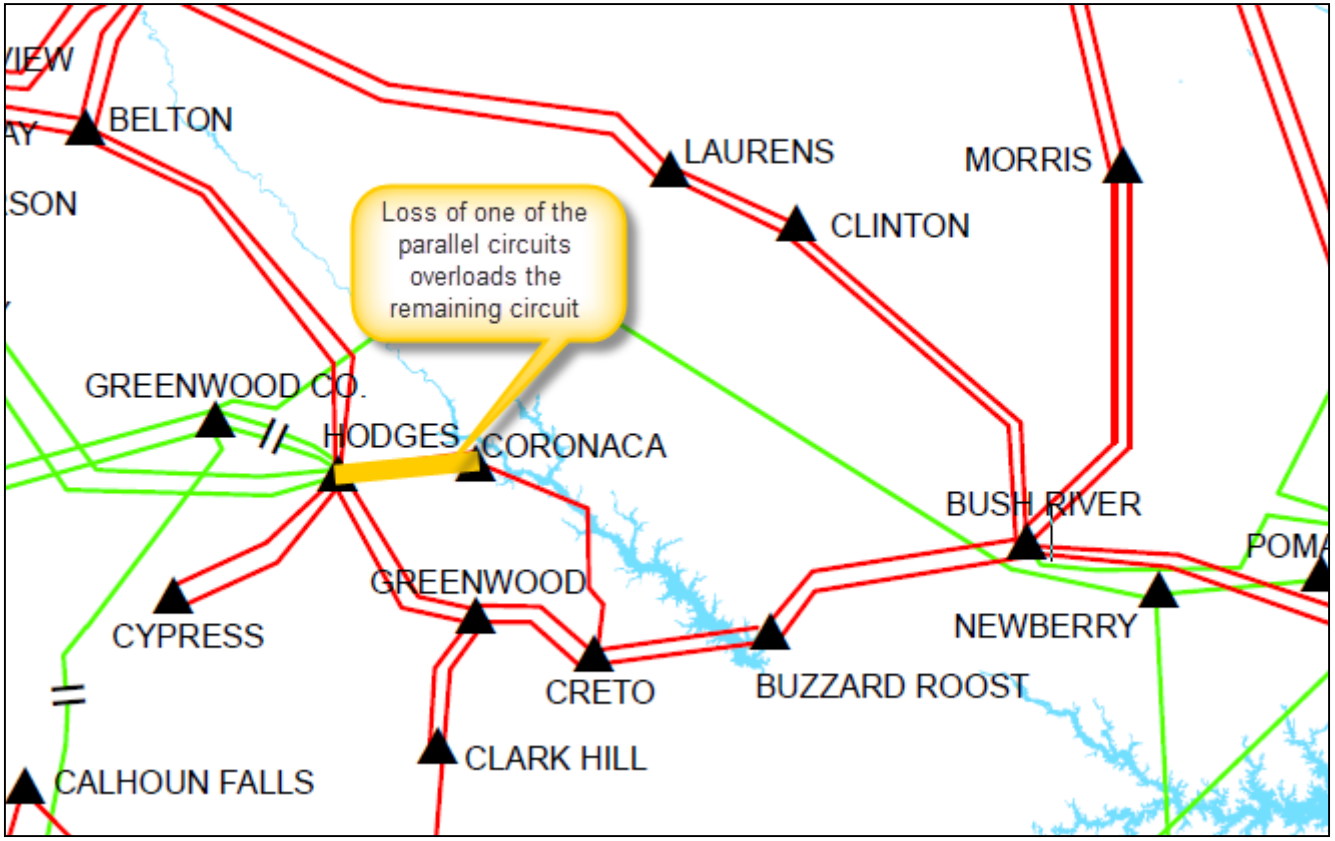
Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement Locations – *DEC*



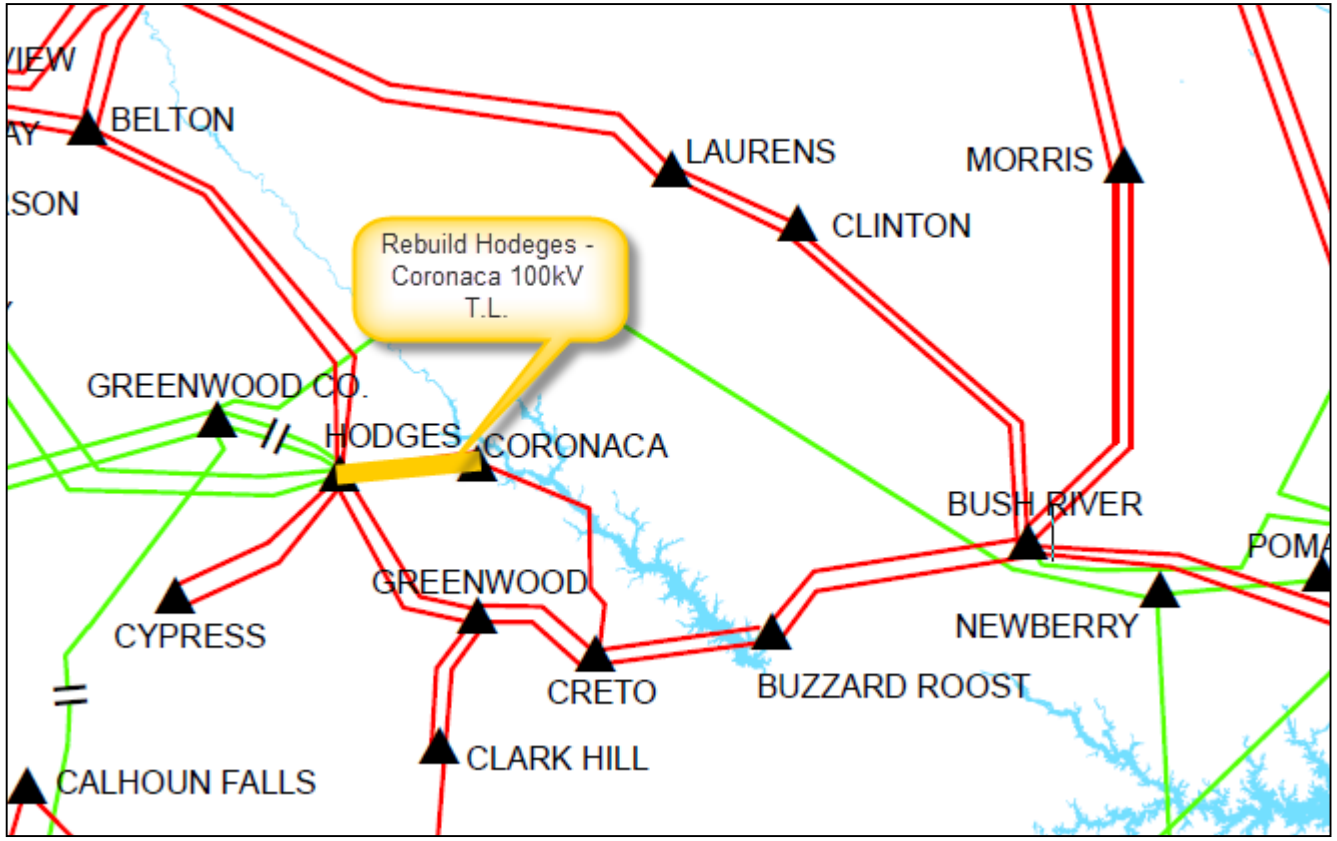
Southern BAA to Santee Cooper – 1000 MW

Significant Constraint (P1) – *DEC*



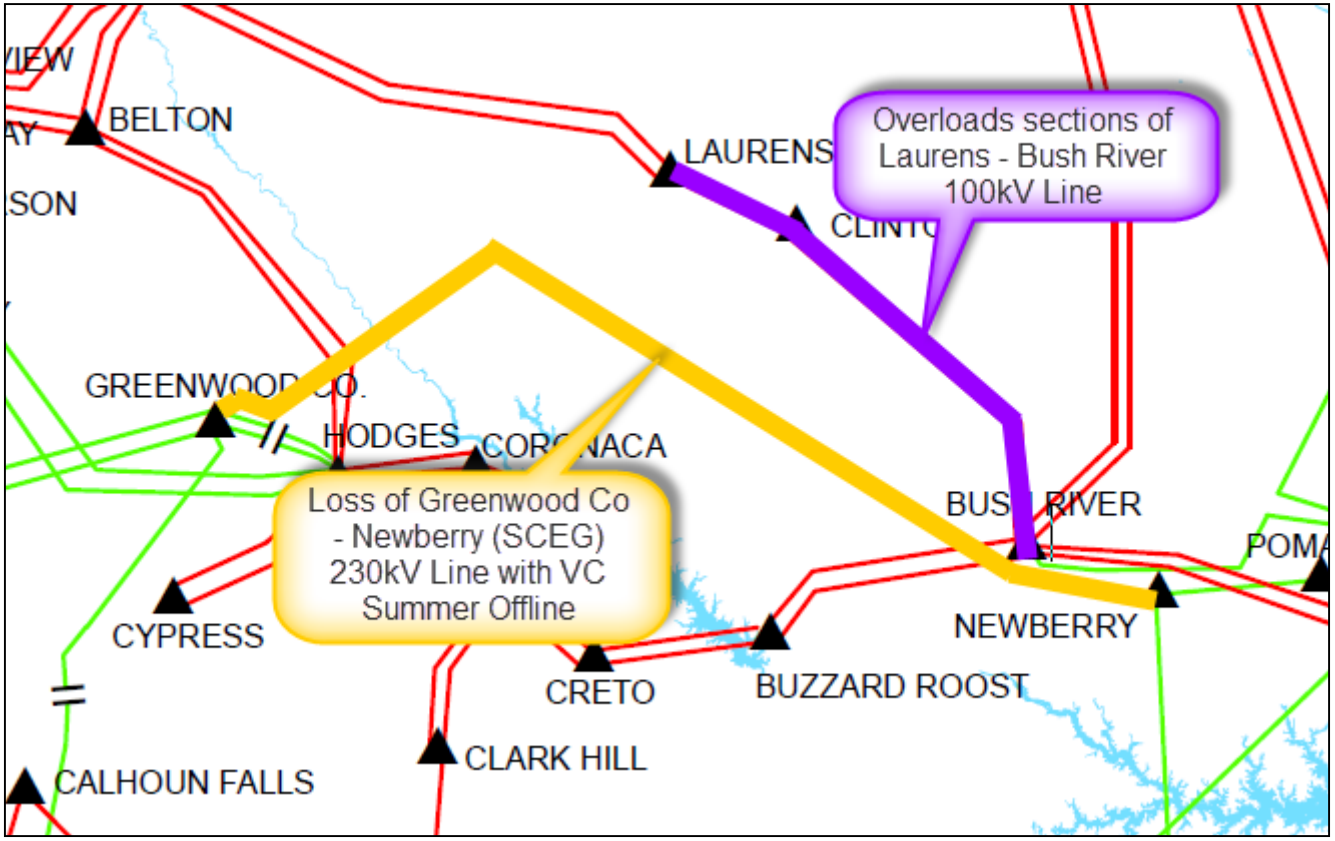
Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement (P1) – *DEC*



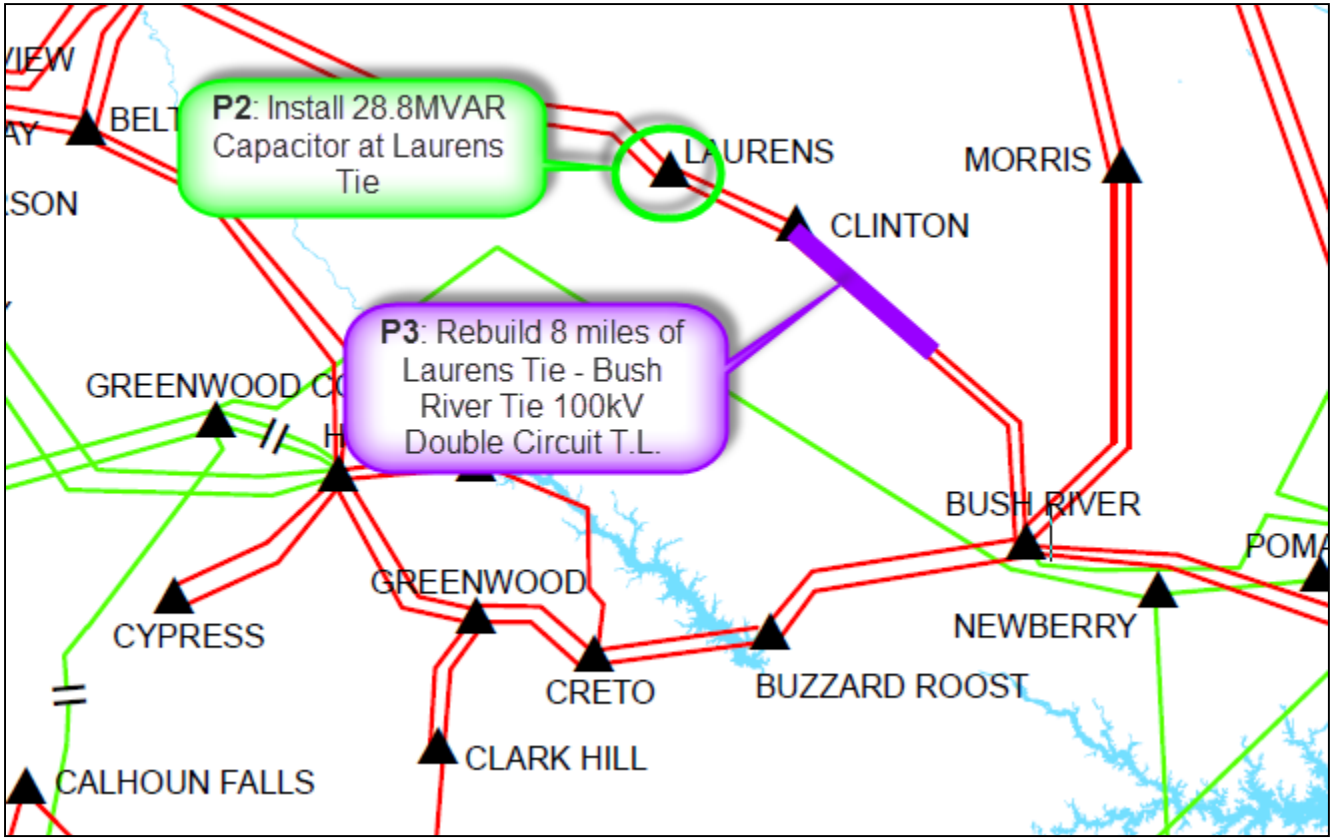
Southern BAA to Santee Cooper – 1000 MW

Significant Constraint (P2 & P3) – *DEC*



Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement (P2 & P3) – *DEC*



Significant Constraints Identified – *SBAA*

Table 3: Significant Constraints - SBAA

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	OFFERMAN – SCREVEN 115kV T.L. Section	91	98.5	107.5

Potential Enhancements Identified – *SBAA*

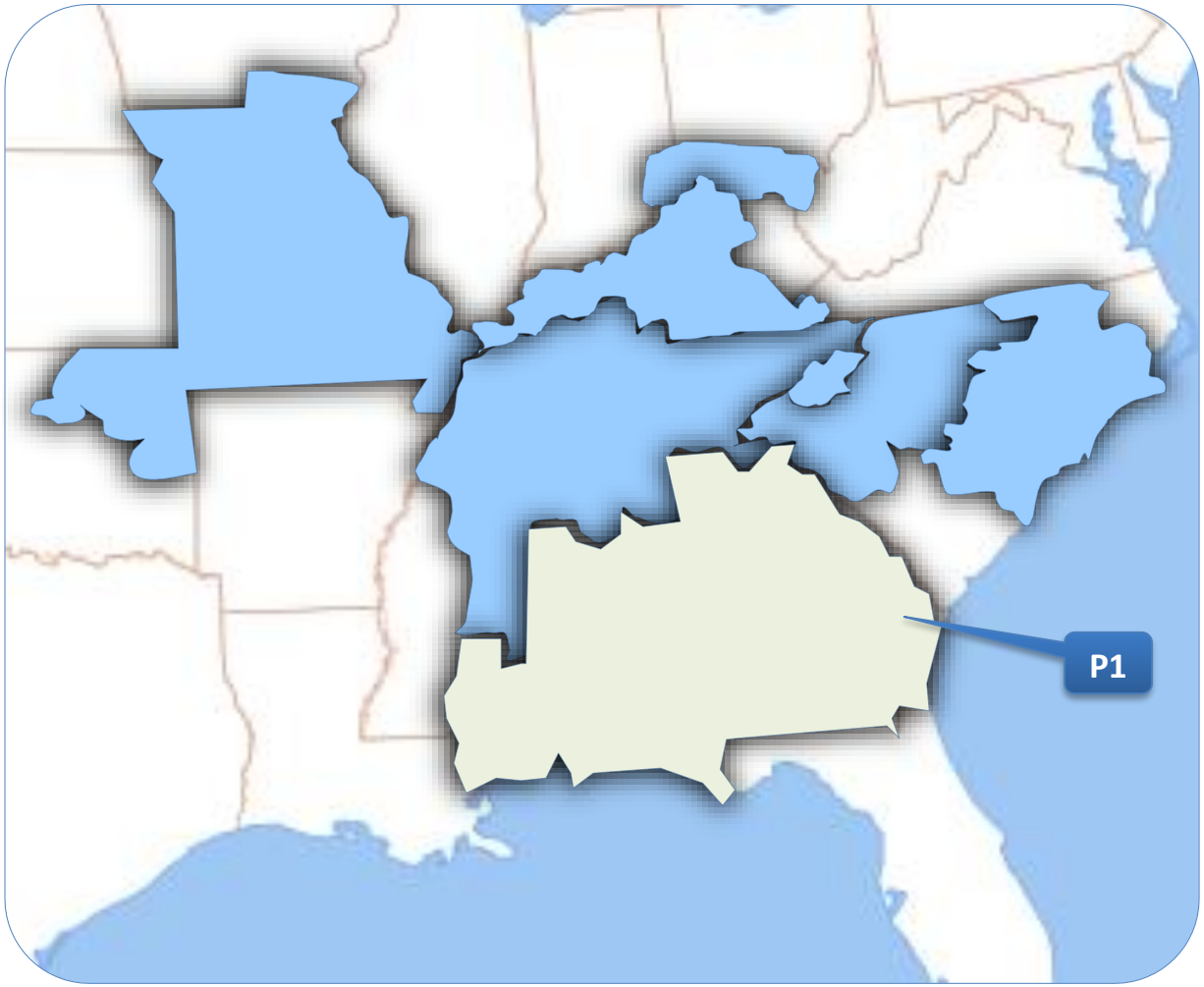
Table 4: Potential Enhancement (P1) - SBAA

Item	Potential Enhancement	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	**$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.

Southern BAA to Santee Cooper – 1000 MW

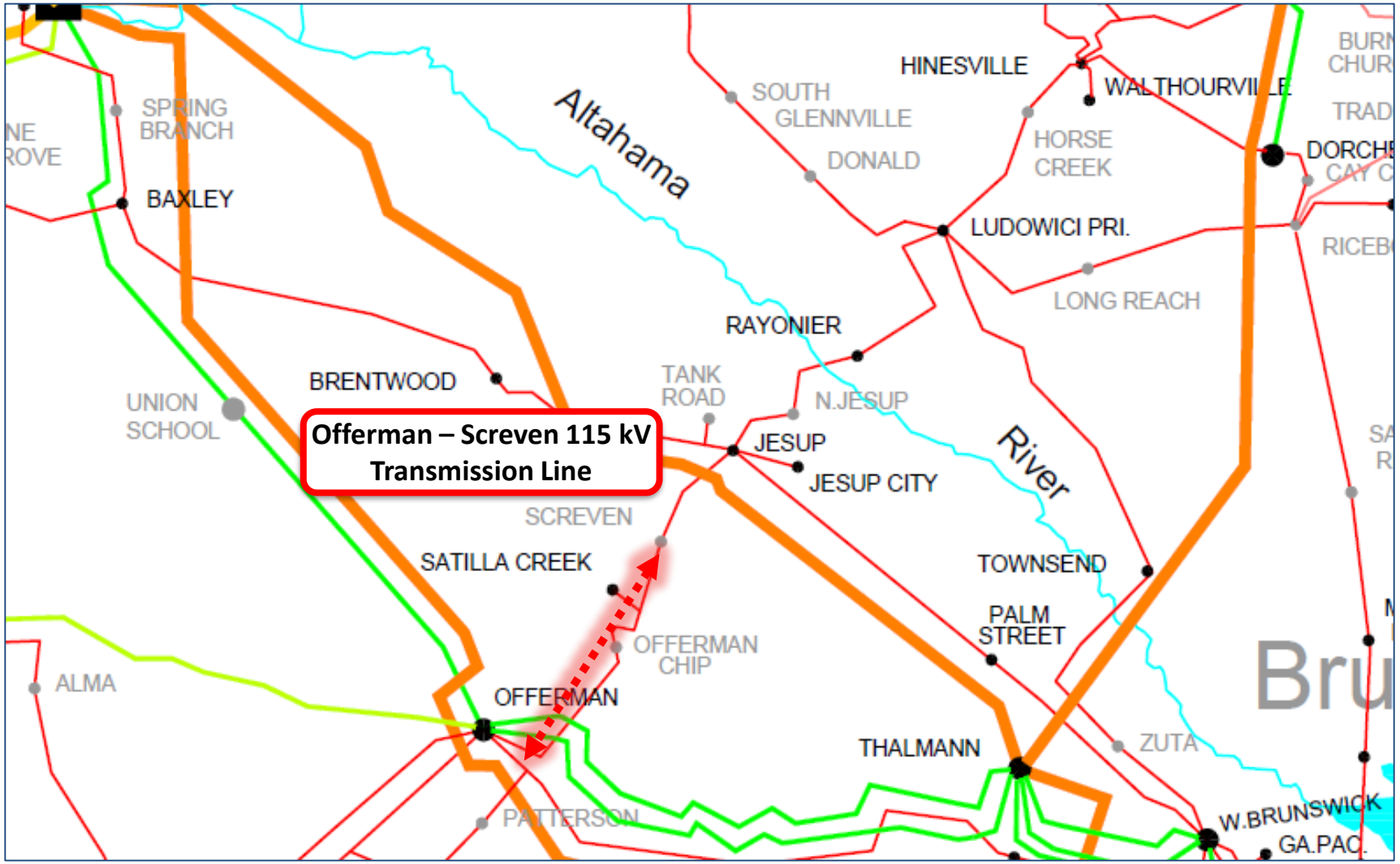
Potential Enhancement (P1) Location – *SBAA*



Southeastern Regional
TRANSMISSION PLANNING

Southern BAA to Santee Cooper – 1000 MW

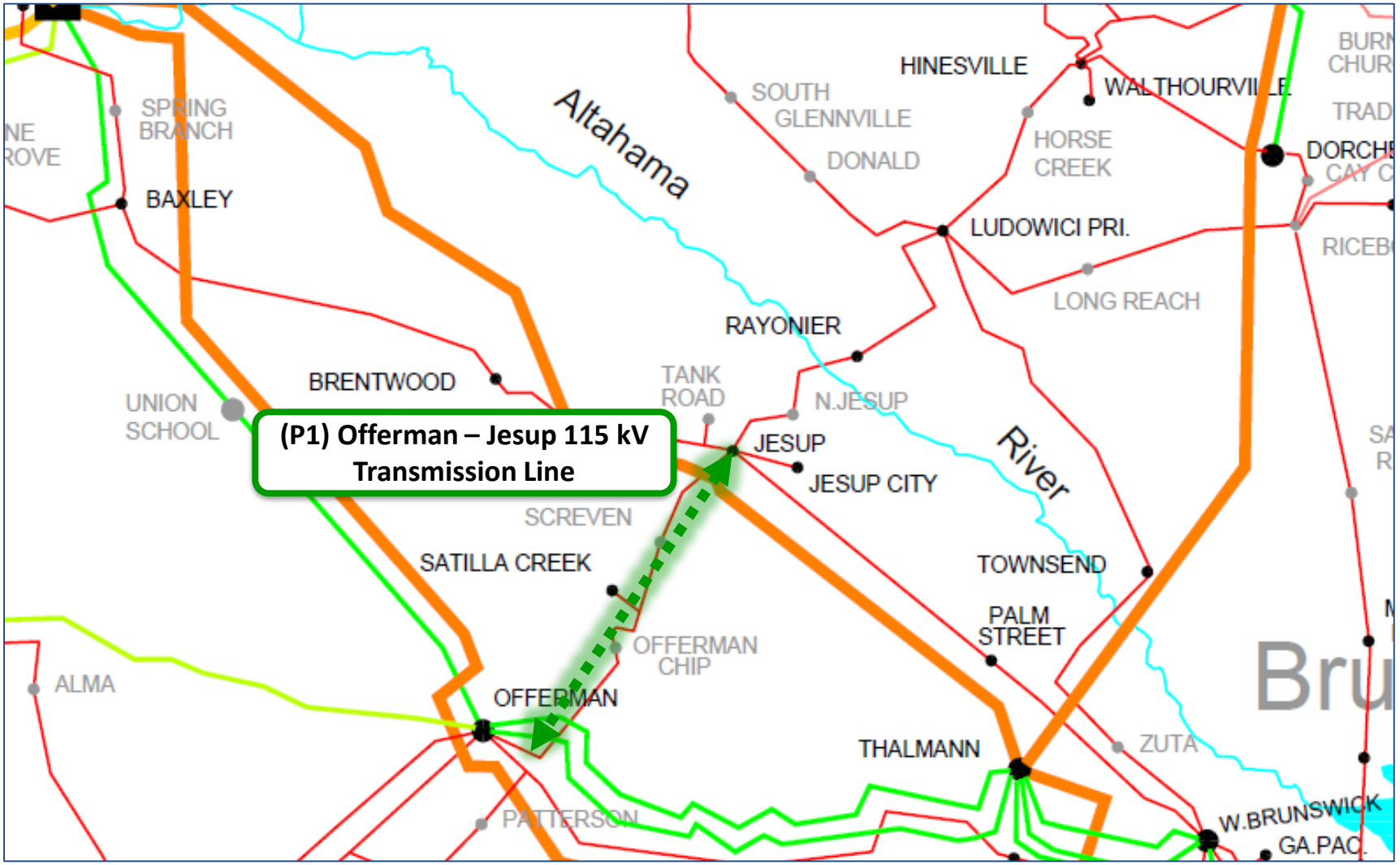
Significant Constraint (P1) – *SBAA*



Southeastern Regional
TRANSMISSION PLANNING

Southern BAA to Santee Cooper – 1000 MW

Potential Enhancement (P1) – *SBAA*



Southern BAA to Santee Cooper – 1000 MW

Transmission System Impacts – *SERTP*

Table 5: Transmission System Impacts - SERTP

Balancing Authority	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
SERTP TOTAL ($2018)	**$42,480,000**

Economic Planning Studies

Economic Planning Studies – Preliminary Results

Santee Cooper Border to Duke Energy Progress and Duke Energy Carolinas 1000 MW

Southeastern Regional TRANSMISSION PLANNING

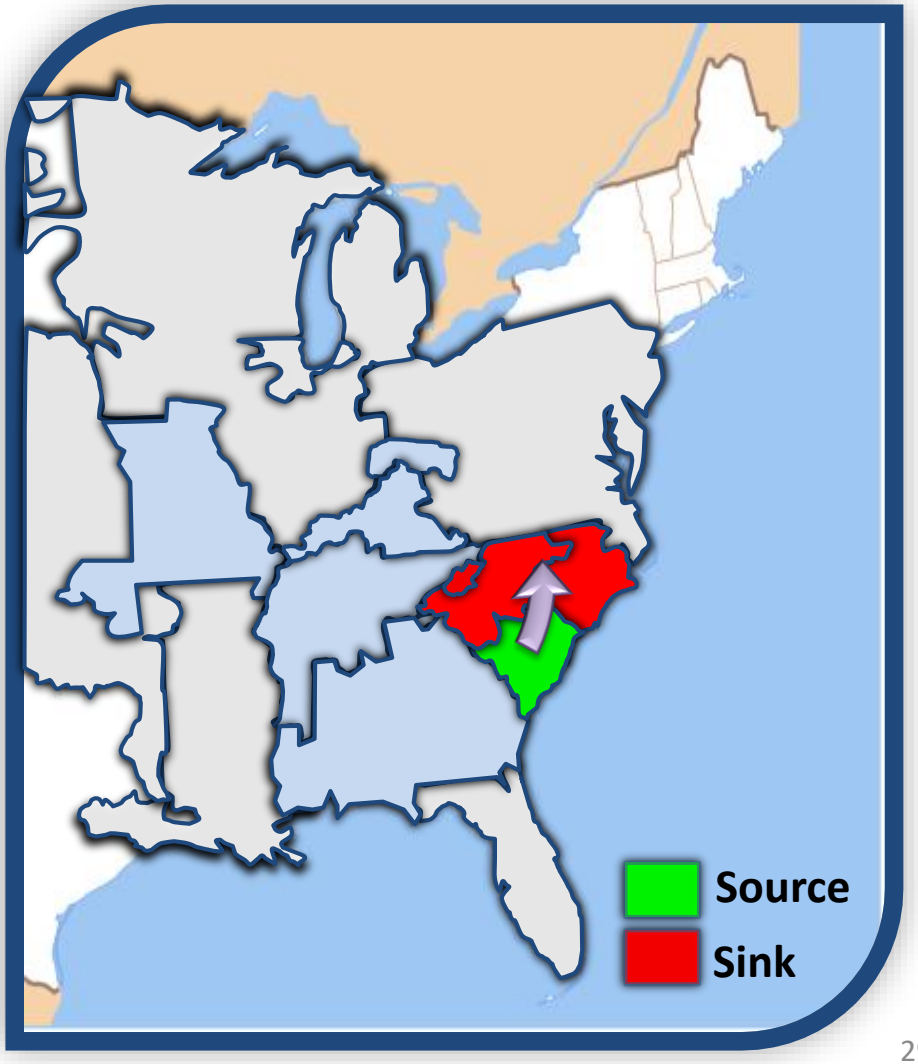
Santee Cooper to Duke Energy – 1000 MW

Study Assumptions

- **Transfer Type:** Load to Generation (2021 Summer Peak)
- **Source:** Uniform load scale within Santee Cooper
- **Sink:** Generation scale within Duke Energy as shown in Table 6 below:

Table 6: Generation Scale within Duke Energy

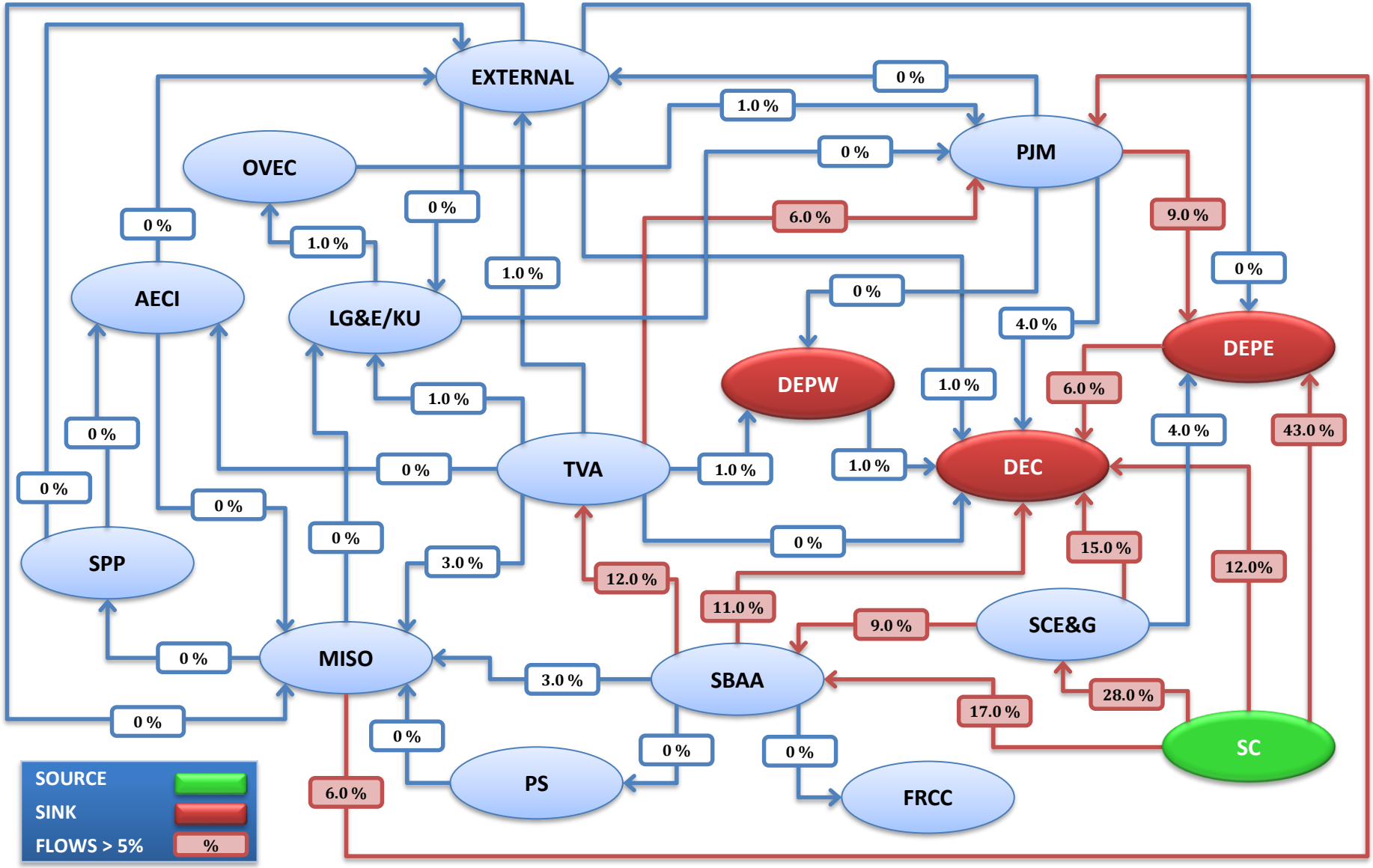
Balancing Authority Area	Area #	MW Allocation
Duke Energy Carolinas	342	-500
Duke Energy Progress	340, 341	-500
Total		-1000



Southeastern Regional
TRANSMISSION PLANNING

Santee Cooper to Duke Energy – 1000 MW

Transfer Flow Diagram (% of Total Transfer)



Santee Cooper to Duke Energy – 1000 MW

Transmission System Impacts – *SERTP*

- **Transmission System Impacts Identified:**
  - Significant constraints were identified in the following SERTP Balancing Authority Areas:
    - ***DEC***
    - ***DEPE***

- **Potential Transmission Enhancements Identified:**
  - (DEC) Two (2) 100kV Transmission Line Upgrades
  - (DEPE) One (1) Substation Upgrade
  - (DEPE) One (1) New 230kV Transmission Line

SERTP Total ($2018) = $57,800,000

Santee Cooper to Duke Energy – 1000 MW

Significant Constraints Identified – *DEC*

Table 7: Significant Constraints - DEC

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Lee Steam – Shady Grove Tie 100kV T.L.	120	94.3	100.5

Santee Cooper to Duke Energy – 1000 MW

Potential Enhancements Identified – *DEC*

Table 8: Potential Enhancements - DEC

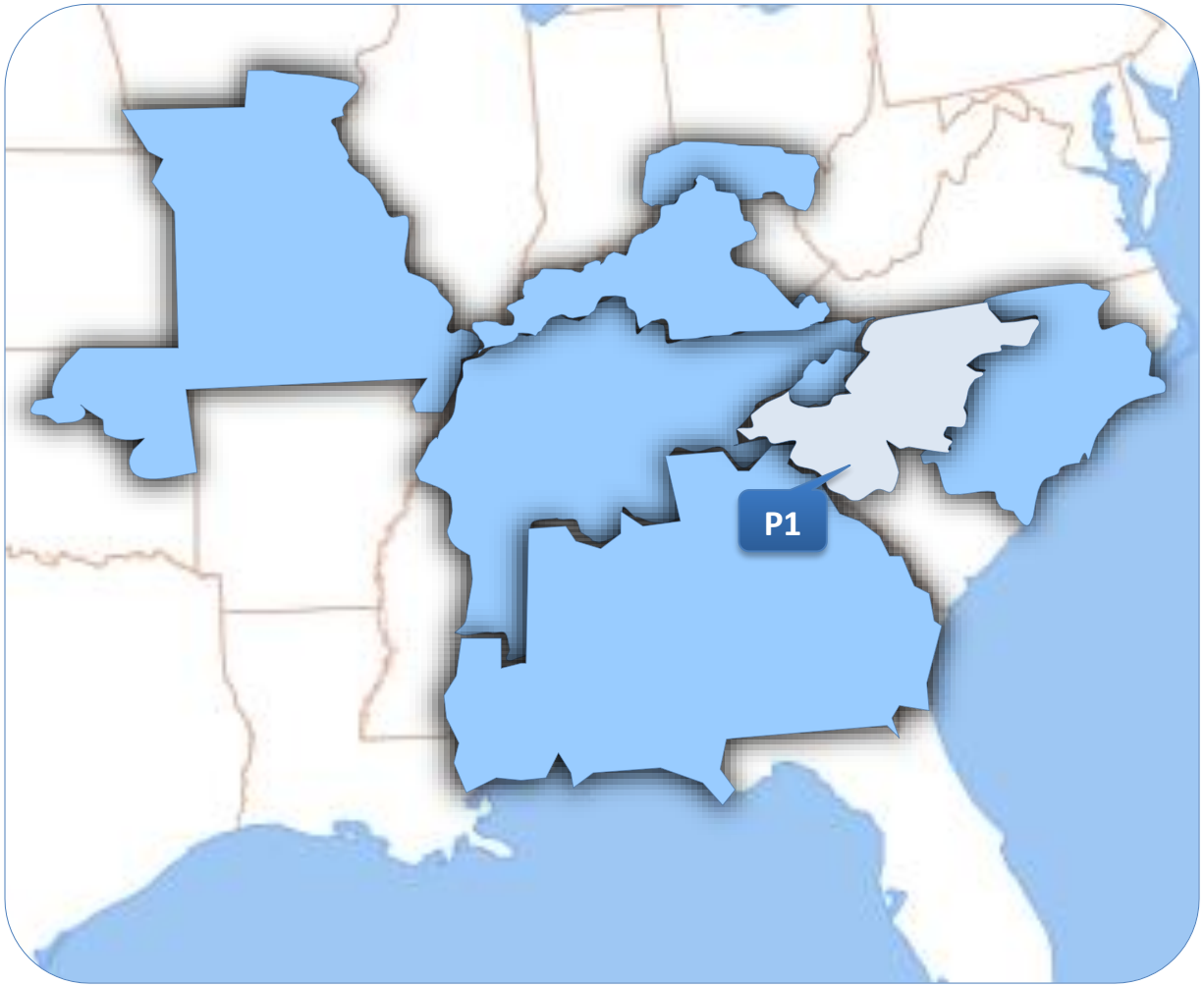
Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Lee Steam – Shady Grove Tie 100kV double circuit Transmission Lines** • Rebuild both double circuit transmission lines (4 circuits) between Lee Steam and Shady Grove Tie with 1158 ACSS conductors rated to 200˚C. Total of 20.5 miles of line upgrades	**$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.

Southeastern Regional TRANSMISSION PLANNING

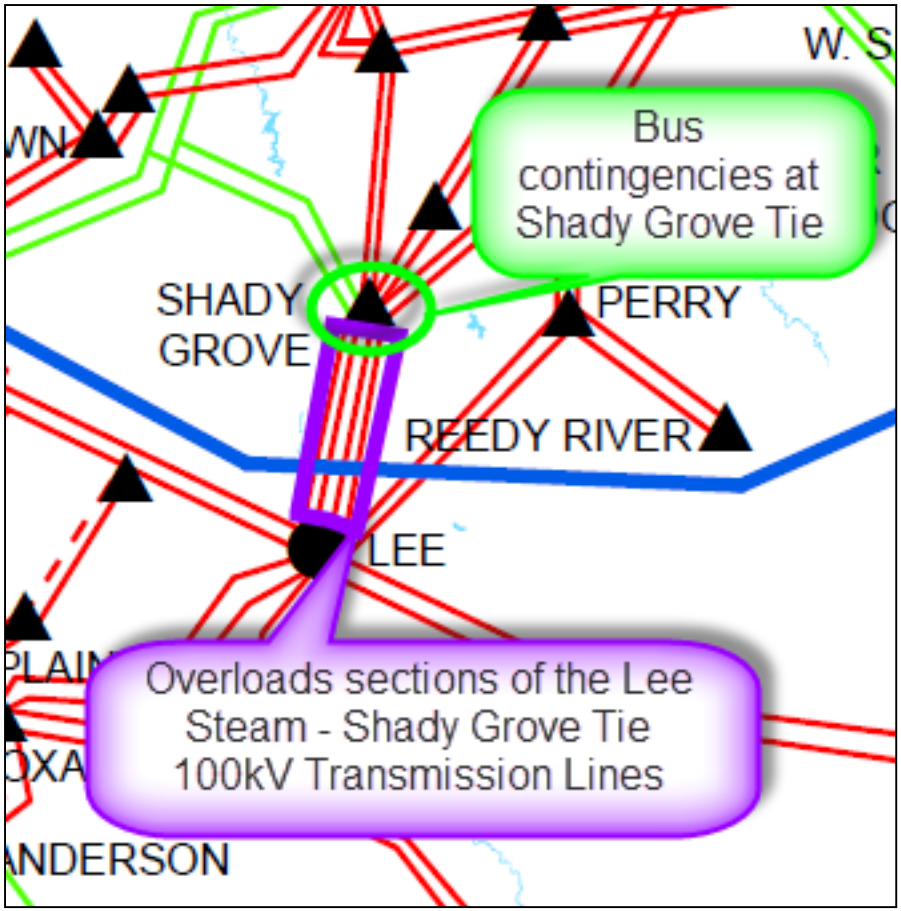
Santee Cooper to Duke Energy – 1000 MW

Potential Enhancement Locations – *DEC*



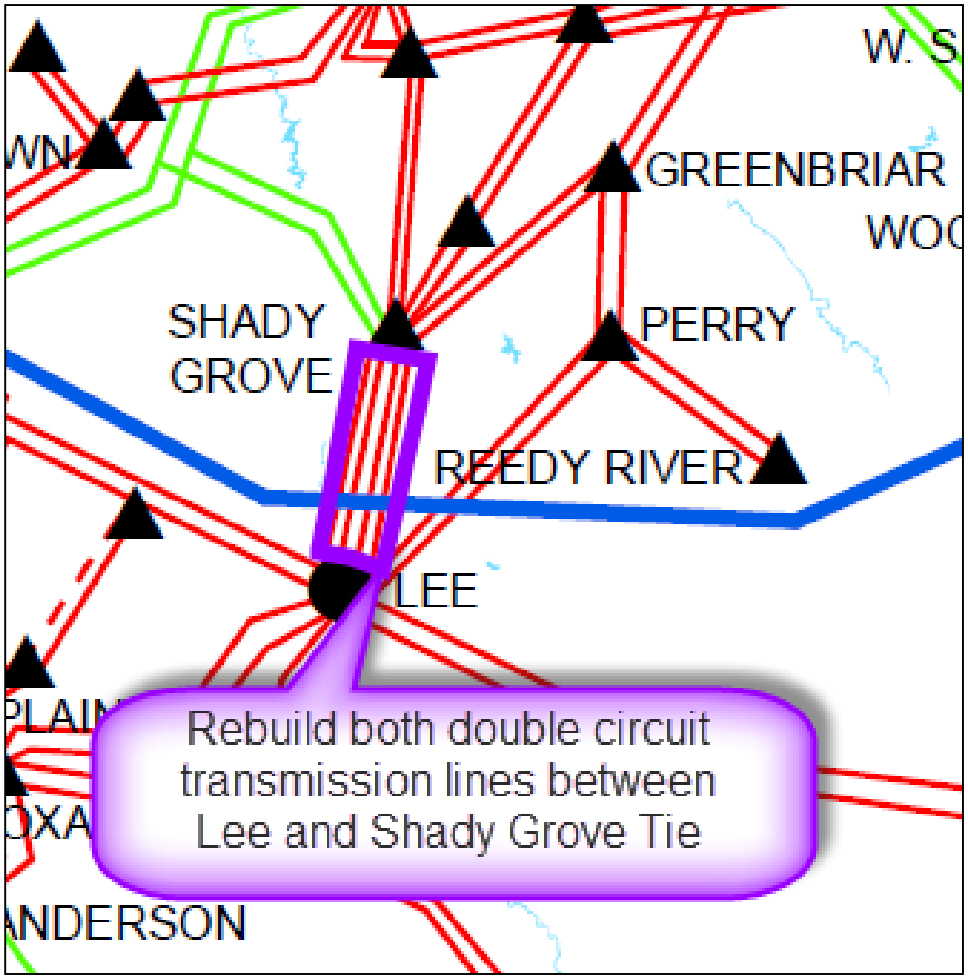
Santee Cooper to Duke Energy – 1000 MW

Significant Constraint (P1) – *DEC*



Santee Cooper to Duke Energy – 1000 MW

Potential Enhancement (P1) – *DEC*



Santee Cooper to Duke Energy – 1000 MW

Significant Constraints Identified – *DEPE*

Table 8: Significant Constraints - DEPE

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Camden-Camden Tap 115kV T.L.	107	96.3	104.5
P1	Camden-Camden Ind 115kV T.L.	107	94.5	102.3
P1	Camden Tap-Camden City 115kV T.L.	107	<85	90.8

Santee Cooper to Duke Energy– 1000 MW

Potential Enhancements Identified – *DEPE*

Table 9: Potential Enhancements - DEPE

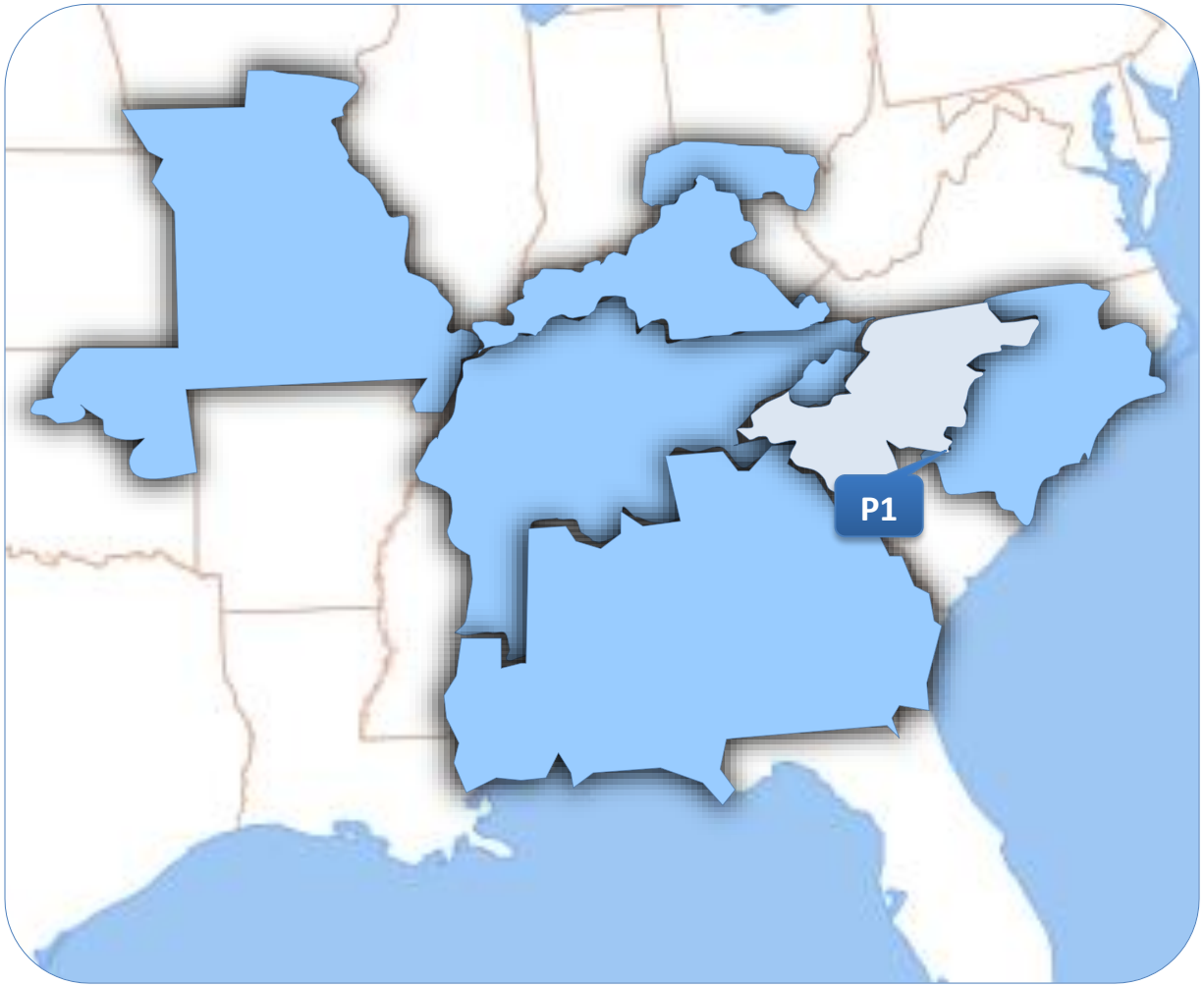
Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Camden-Camden Tap 115kV Transmission Line Section** **Camden-Camden Ind 115kV Transmission Line Section** **Camden Tap-Camden City 115kV Transmission Line Section** • Upgrade Camden Junction 115kV Switching Station to 230kV Substation, Construct Camden Junction-(SCPSA)Camden 230kV Transmission Line	**$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.

Southeastern Regional
TRANSMISSION PLANNING

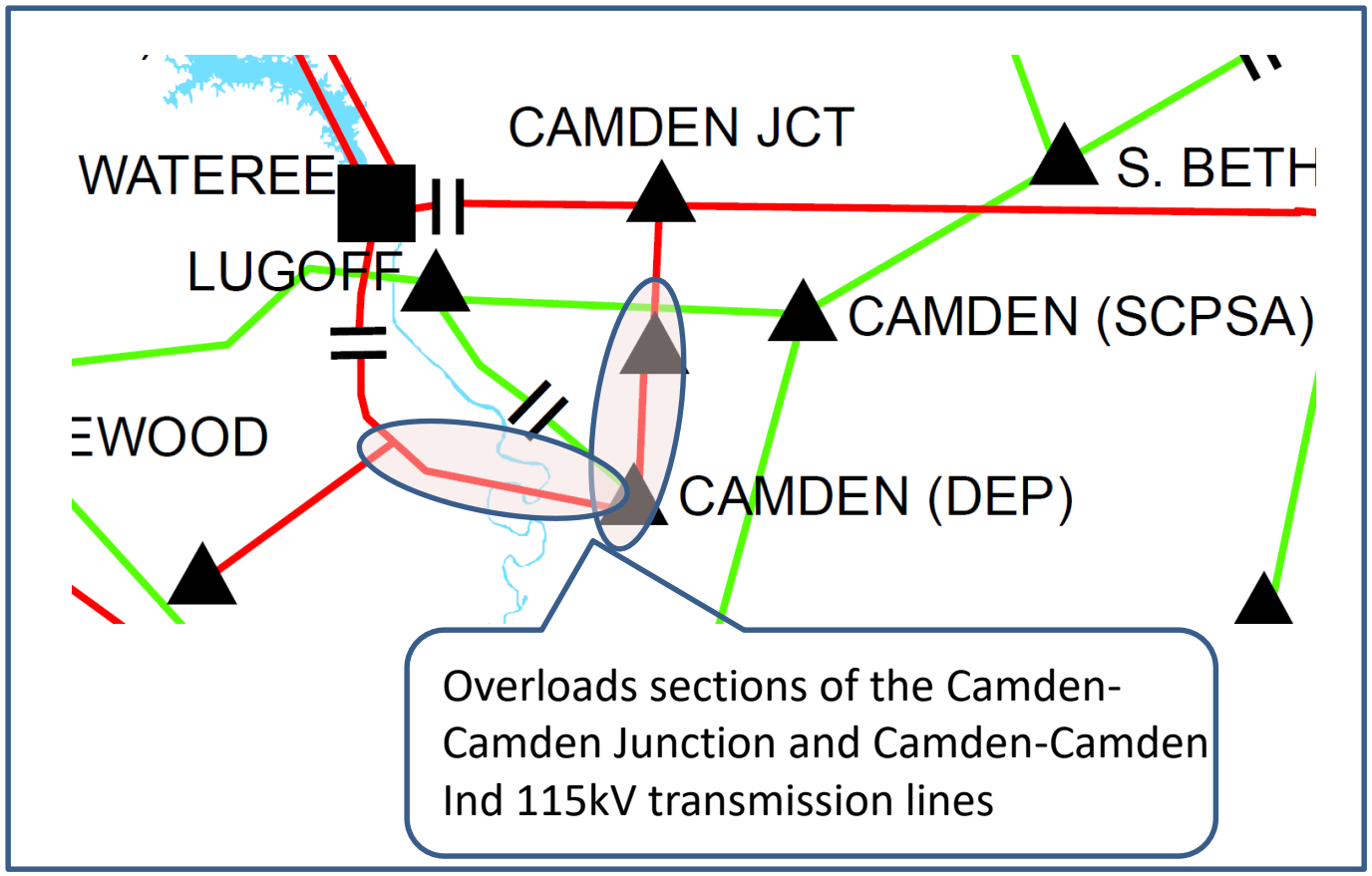
Santee Cooper to Duke Energy– 1000 MW

Potential Enhancement Locations – *DEPE*



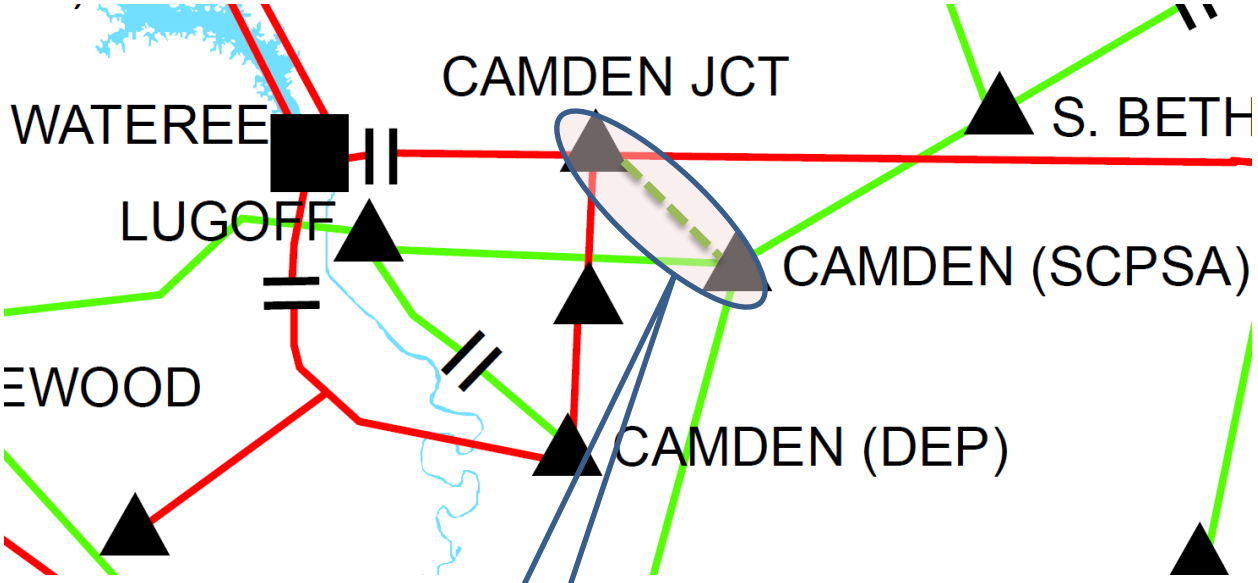
Santee Cooper to Duke Energy – 1000 MW

Significant Constraints (P1) – *DEPE*



Santee Cooper to Duke Energy – 1000 MW

Potential Enhancement (P1) – *DEPE*



Upgrade Camden Junction 115kV Switching Station to 230kV Substation, Construct Camden Junction-(SCPSA)Camden 230kV Transmission Line

Santee Cooper to Duke Energy – 1000 MW

Transmission System Impacts – *SERTP*

Table 10: Transmission System Impacts - SERTP

Balancing Authority	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
SERTP TOTAL ($2018)	**$57,800,000**

Economic Planning Studies

Economic Planning Studies – Preliminary Results

Duke Energy Progress and Duke Energy Carolinas to Santee Cooper Border
1000 MW

Southeastern Regional TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

Study Assumptions

- **Transfer Type:** Generation to Load (2021 Summer Peak)
- **Source:** Generation scale within Duke Energy as shown in Table 11 below
- **Sink:** Uniform load scale within Santee Cooper

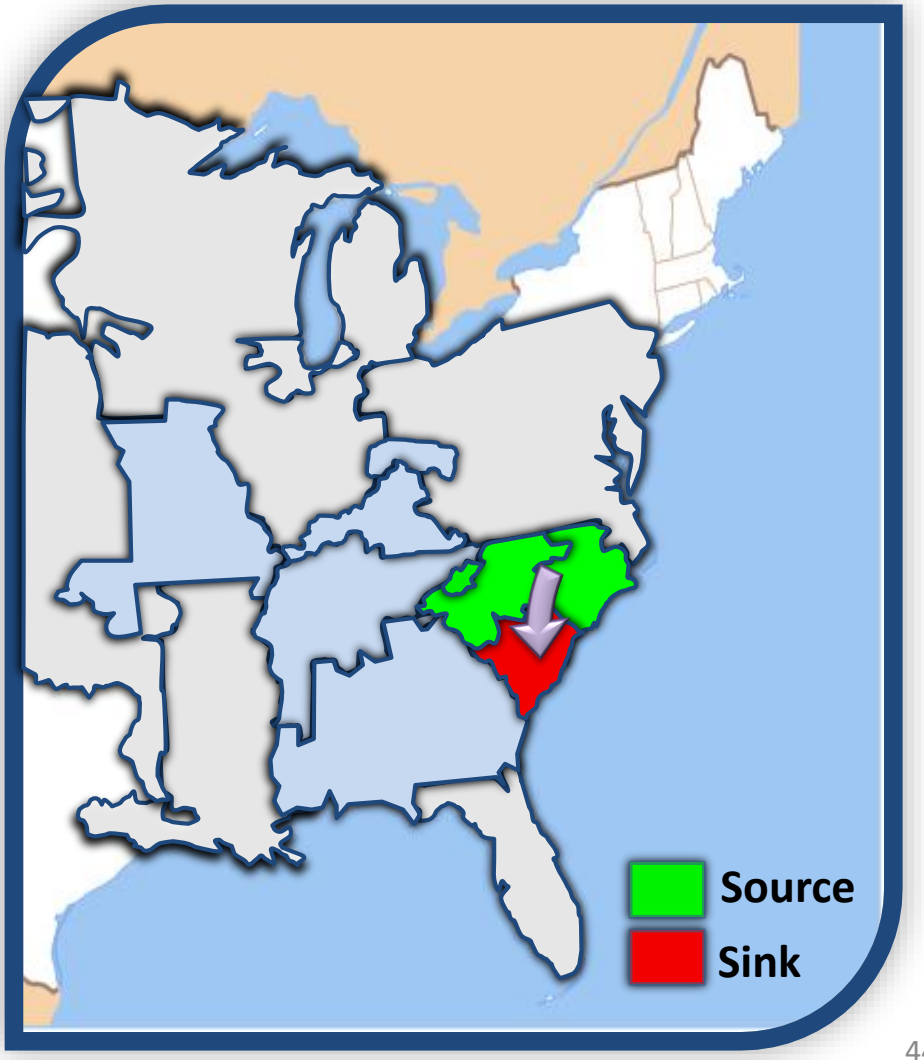


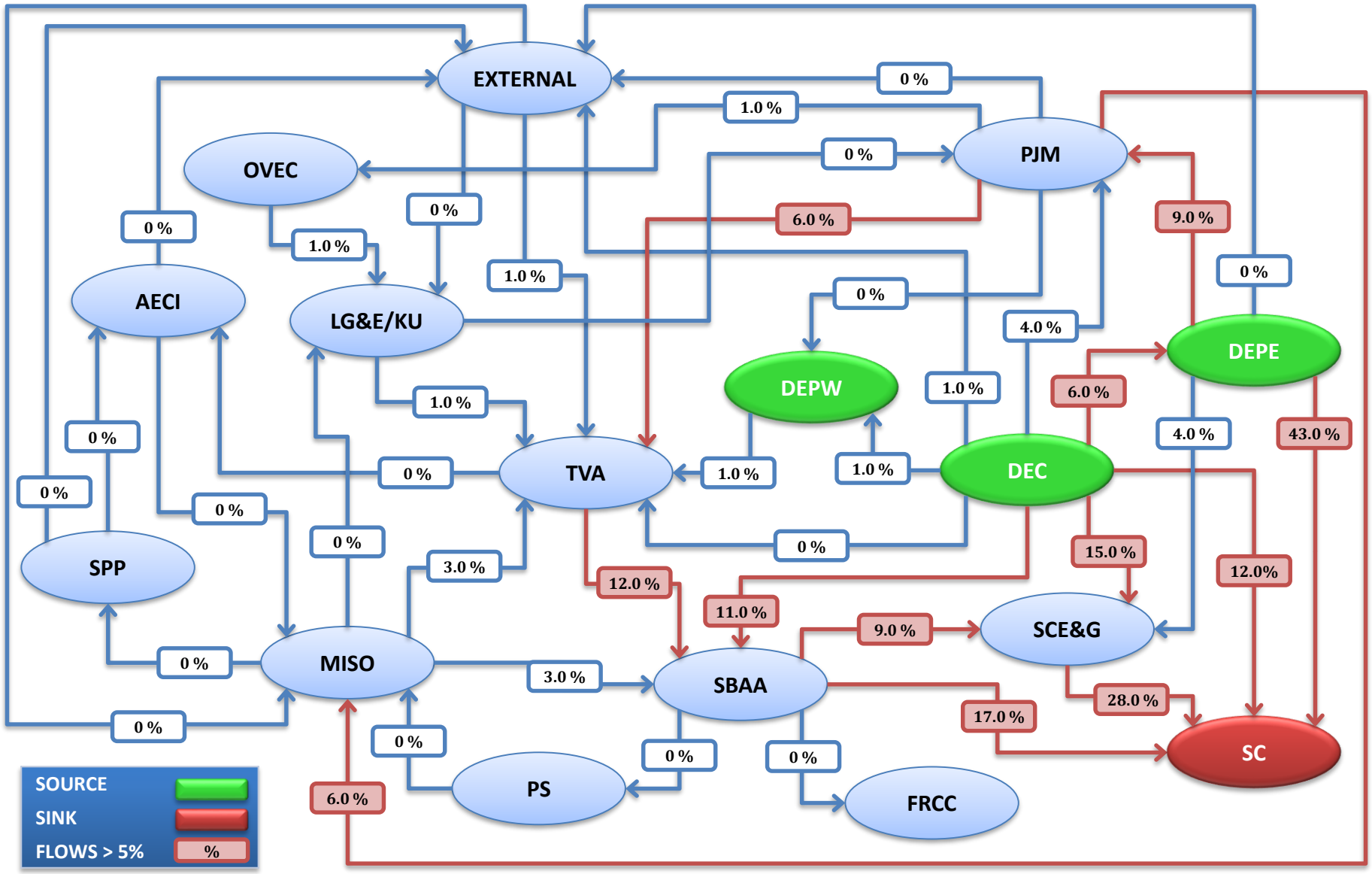
Table 11: Generation Scale within Duke Energy

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

Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

Transfer Flow Diagram (% of Total Transfer)



Duke Energy to Santee Cooper – 1000 MW

Transmission System Impacts – *SERTP*

- **Transmission System Impacts Identified:**
  - Significant constraints were identified in the following SERTP Balancing Authority Areas:
    - ***DEC***
    - ***SBAA***
- **Potential Transmission Enhancements Identified:**
  - (DEC) Two (2) 100kV Transmission Line Upgrades
  - (DEC) One (1) Capacitor Bank Installation
  - (SBAA) One (1) 115kV Transmission Line Upgrade

SERTP Total ($2018) = $42,480,000

Duke Energy to Santee Cooper– 1000 MW

Significant Constraints Identified – *DEC*

Table 12: Significant Constraints - DEC

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	Hodges Tie – Coronaca Tie 100kV T.L.	129	115.1	133.8
P2, P3	Laurens Tie – Bush River Tie 100kV T.L.	65	80.2	101.9

Duke Energy to Santee Cooper– 1000 MW

Potential Enhancements Identified – *DEC*

Table 13: Potential Enhancements - DEC

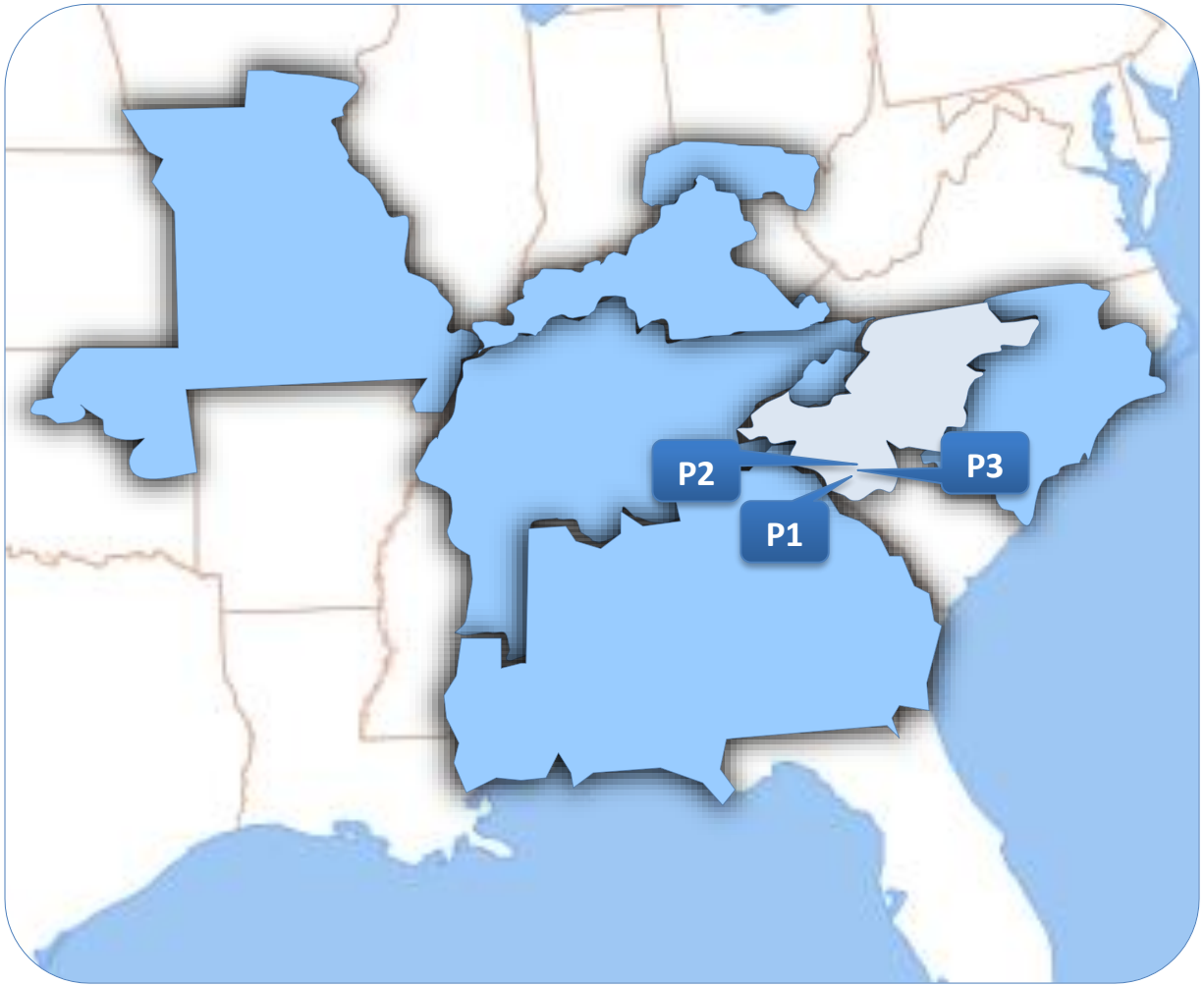
Item	Potential Enhancement	Planning Level Cost Estimate
P1	**Hodges Tie – Coronaca Tie 100kV double circuit** T.L. • Rebuild the entire 9.2 mile Hodges Tie – Coronaca Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C.	**$12,700,000**
P2	**Laurens Tie** • Install a 28.8 MVAR capacitor bank at Laurens Tie.	**$900,000**
P3	**Laurens Tie – Bush River Tie 100kV double circuit T.L.** • Rebuild approximately 8.0 miles of Laurens Tie – Bush River Tie 100kV double circuit transmission line with 954 ACSR conductors rated to 120˚C.	**$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.

Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper– 1000 MW

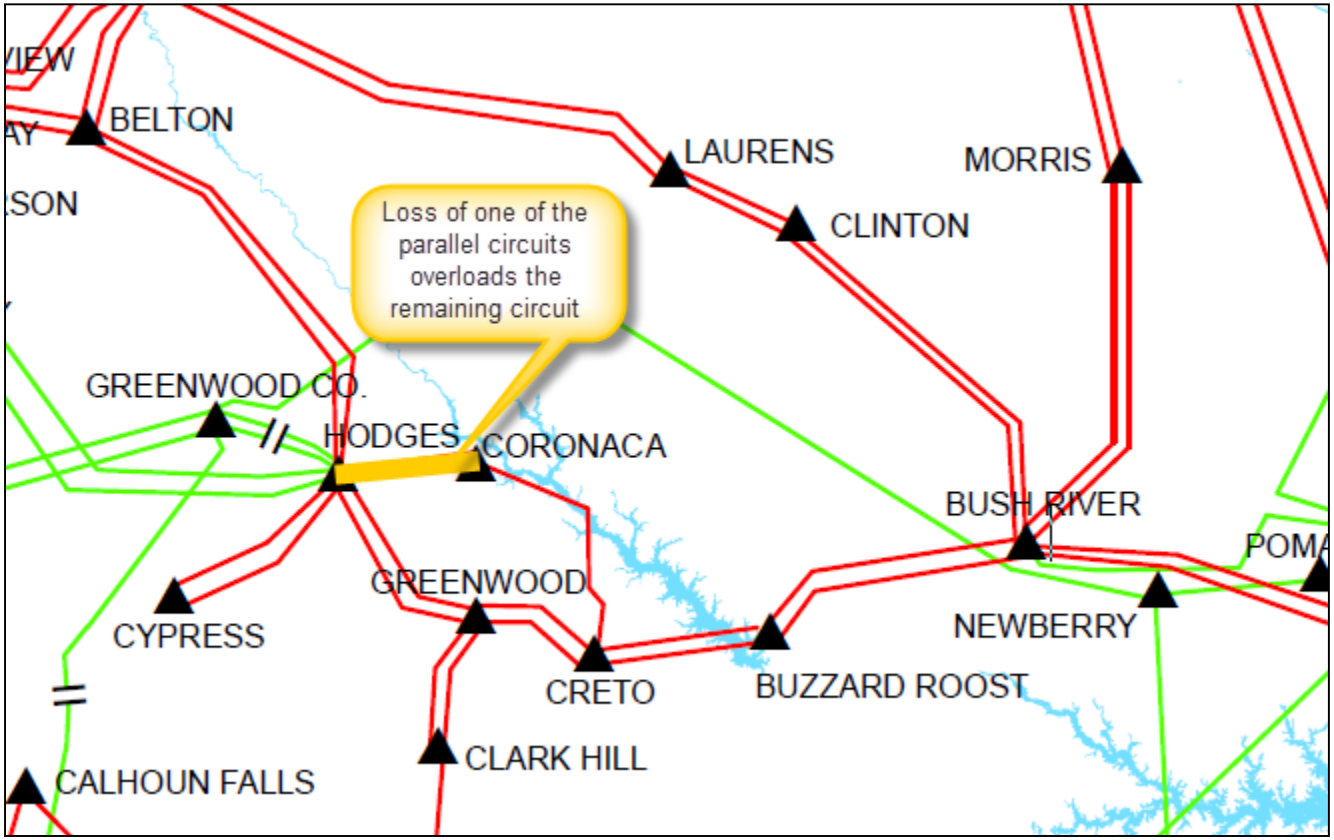
Potential Enhancement Locations – *DEC*



Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper– 1000 MW

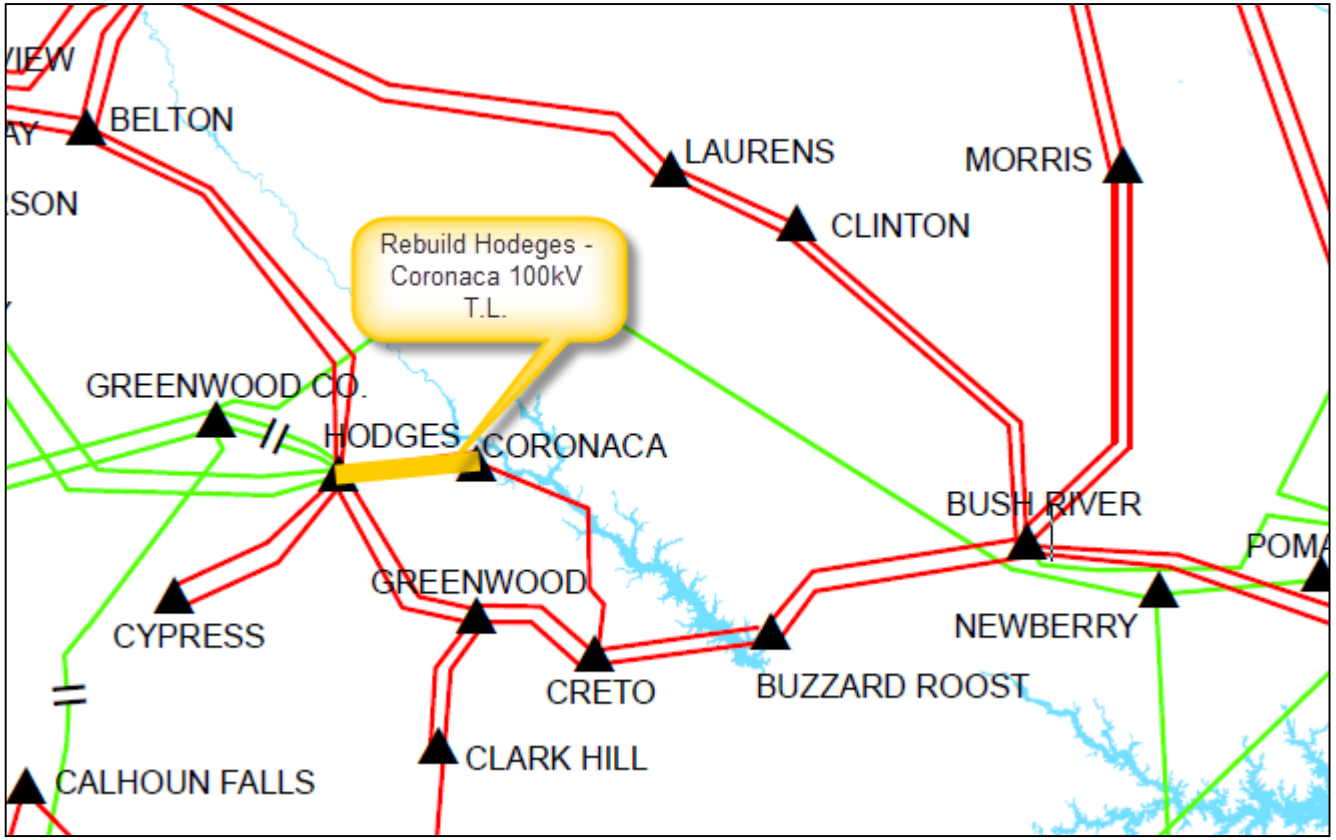
Significant Constraint (P1) – *DEC*



Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper– 1000 MW

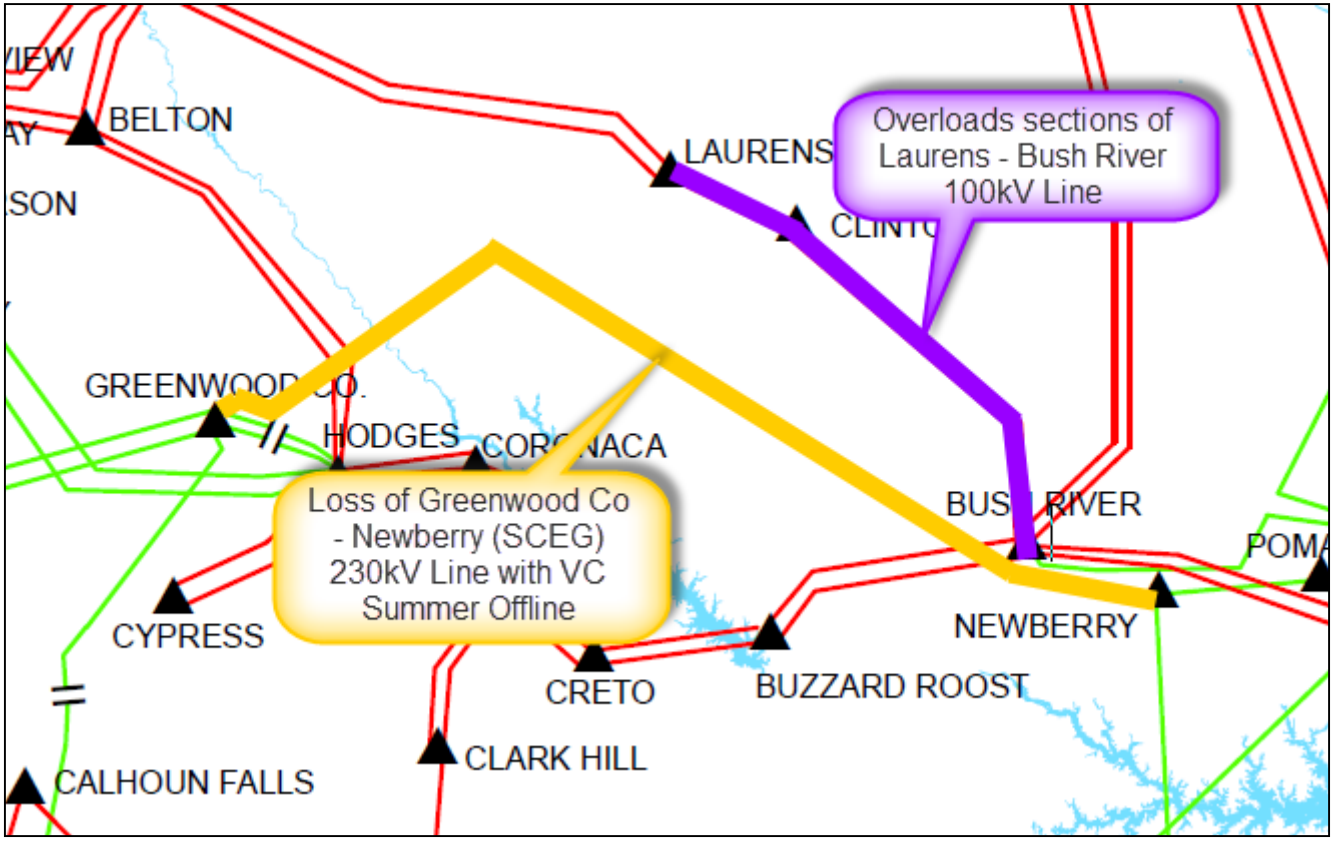
Potential Enhancement (P1) – *DEC*



Southeastern Regional
TRANSMISSION PLANNING

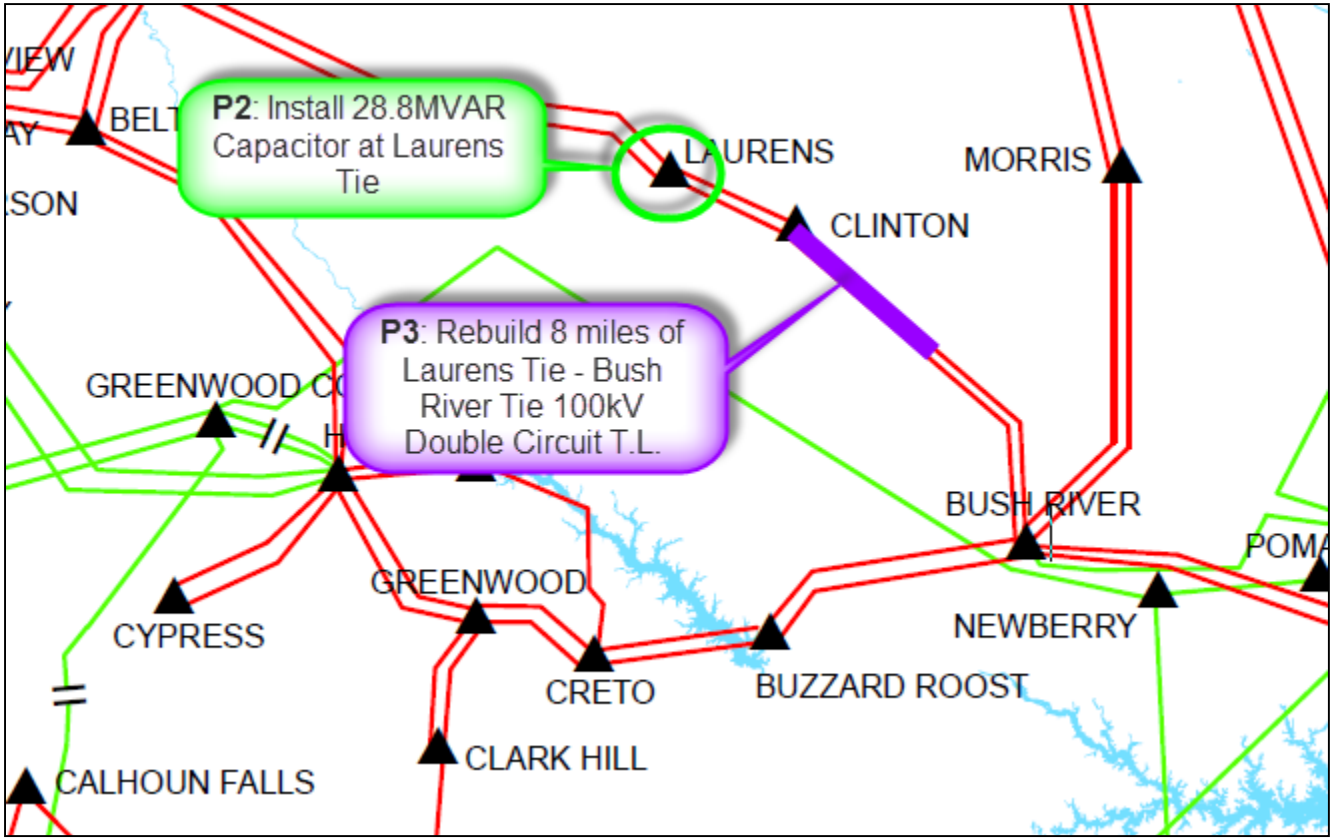
Duke Energy to Santee Cooper– 1000 MW

Significant Constraint (P2 & P3) – *DEC*



Duke Energy to Santee Cooper– 1000 MW

Potential Enhancement (P2 & P3) – *DEC*



Duke Energy to Santee Cooper – 1000 MW

Significant Constraints Identified – *SBAA*

Table 14: Significant Constraints (P1) - SBAA

Potential Enhancement	Limiting Element	Rating (MVA)	Thermal Loadings (%)	
			Without Request	With Request
P1	OFFERMAN – SCREVEN 115kV T.L. Section	91	98.5	104.1

Duke Energy to Santee Cooper – 1000 MW

Potential Enhancements Identified – *SBAA*

Table 15: Potential Enhancement (P1) - SBAA

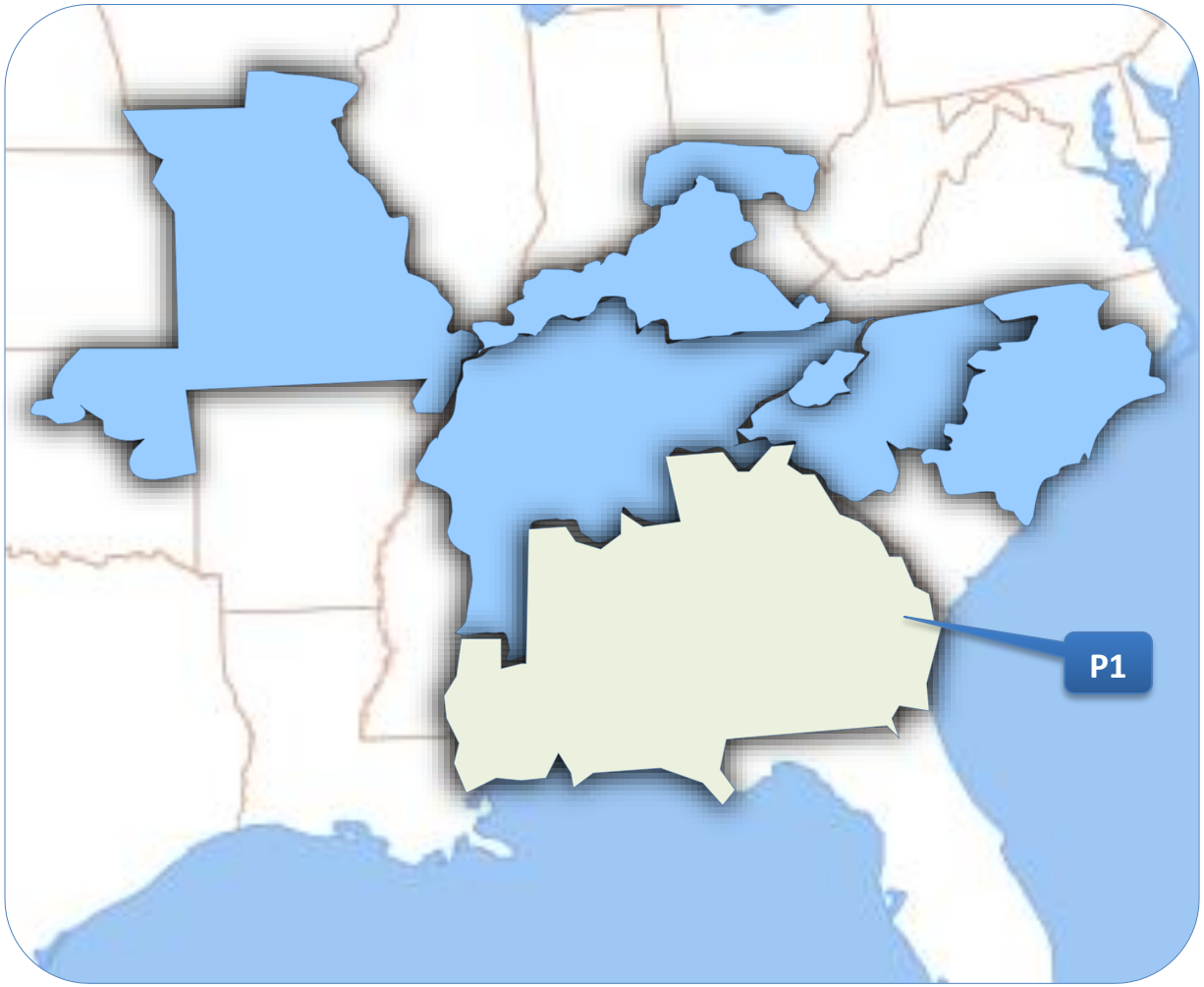
Item	Potential Enhancement	Planning Level Cost Estimate
P1	**OFFERMAN – JESUP 115kV Transmission Line Rebuild** • Rebuild approximately 20.1 miles of the Offerman – Jesup 115kV Transmission Line with 100°C 795 ACSR	**$16,080,000**
SBAA TOTAL ($2018)		**$16,080,000** (1)

(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.

Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

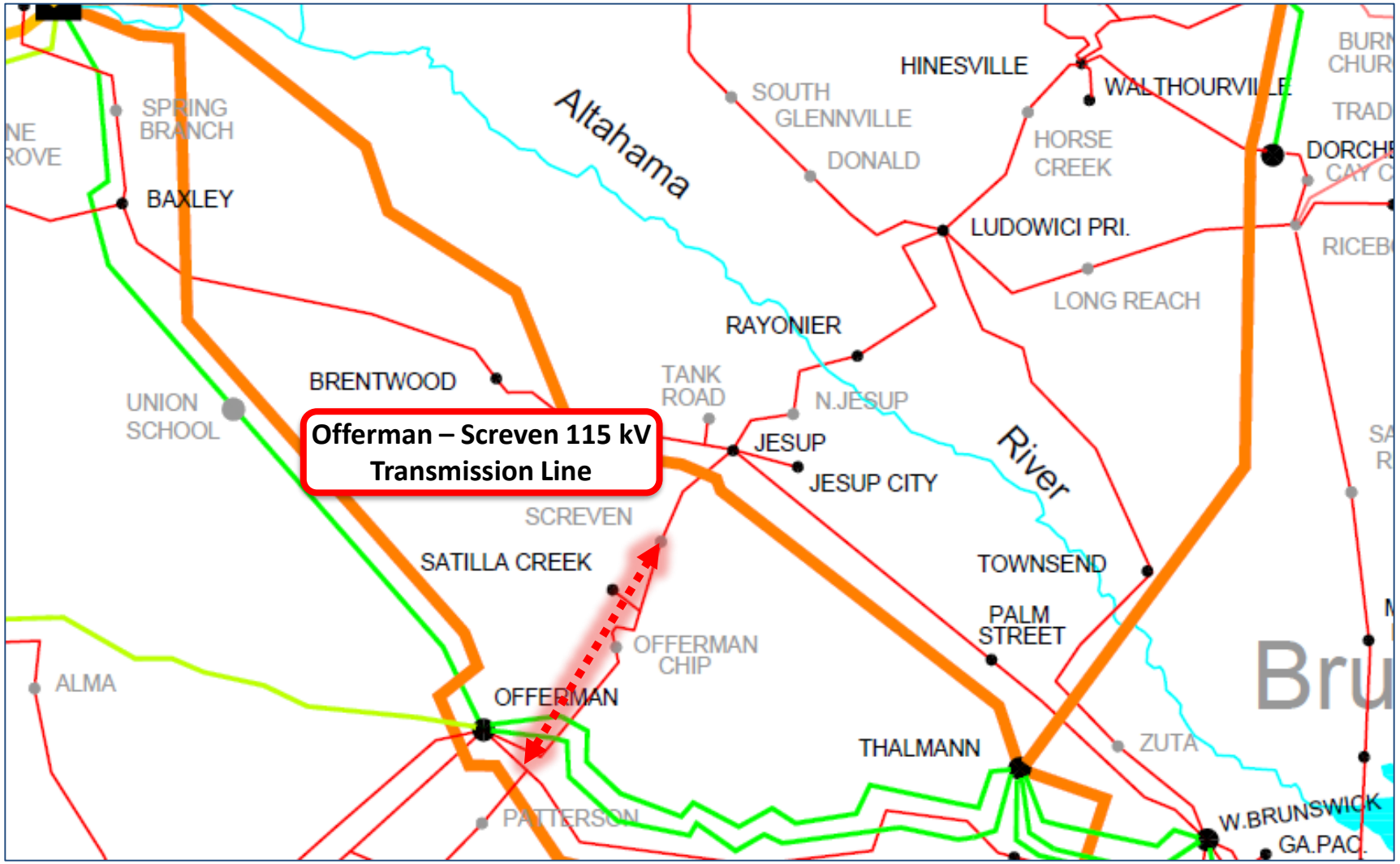
Potential Enhancement (P1) Location – *SBAA*



Southeastern Regional TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

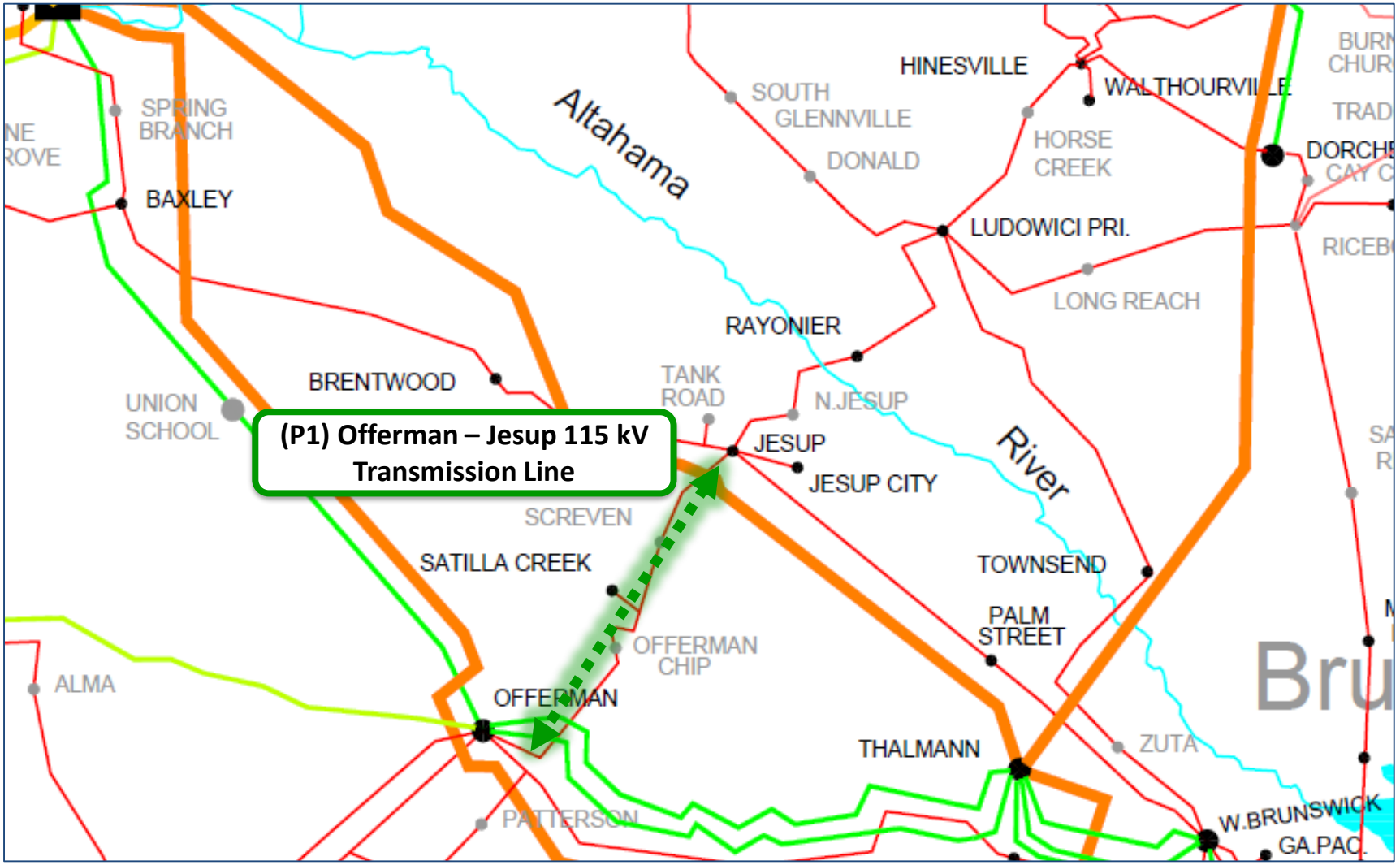
Significant Constraint (P1) – *SBAA*



Southeastern Regional
TRANSMISSION PLANNING

Duke Energy to Santee Cooper – 1000 MW

Potential Enhancement (P1) – *SBAA*



Duke Energy to Santee Cooper – 1000 MW

Transmission System Impacts – *SERTP*

Table 16: Transmission System Impacts - SERTP

Balancing Authority	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
SERTP TOTAL ($2018)	**$42,480,000**

SERTP

Miscellaneous Updates

Regional Planning Update

- Version 2 SERTP Regional Models available on SERTP Website

- Plan in place to facilitate the exchange of the latest transmission models for the ten year planning horizon with FRCC
  - FRCC models will be incorporated into subsequent regional power flow models

- SERTP Sponsors beginning analyses on regional models including assessment to identify and evaluate potential regional transmission projects

Southeastern Regional TRANSMISSION PLANNING

2018 Regional Transmission Analyses

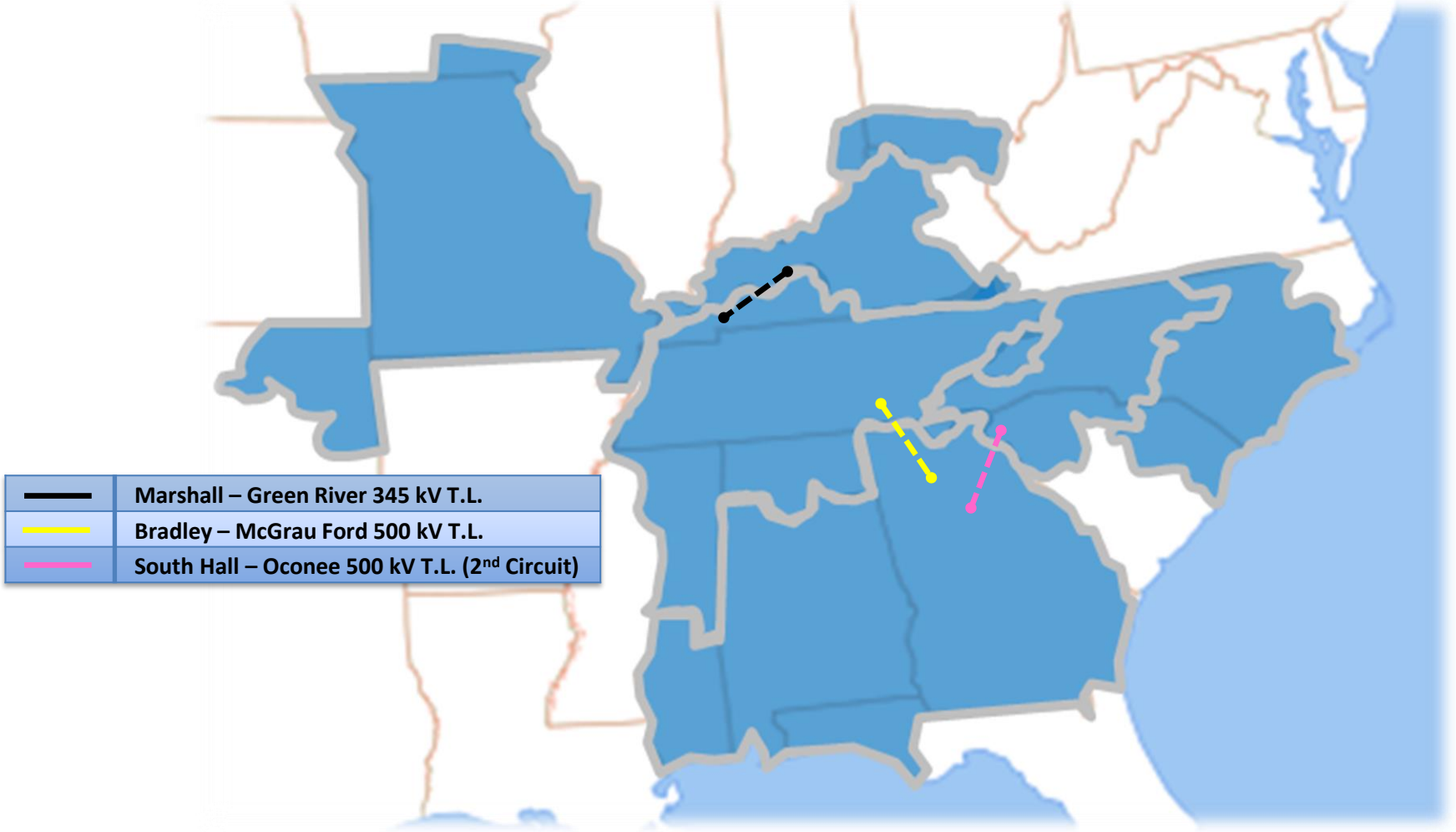
Preliminary List of Alternative Regional Transmission Projects

Alternative Regional Transmission Projects	Miles	From	To
		BAA (State)	BAA (State)
Marshall – Green River 345 kV T.L.	85	TVA (TN)	LG&E/KU (KY)
Bradley – McGrau Ford 500 kV T.L.	60	TVA (TN)	SBAA (GA)
South Hall – Oconee 500 kV T.L. (2nd Circuit)	70	SBAA (GA)	DEC (SC)

Southeastern Regional
TRANSMISSION PLANNING

2018 Regional Transmission Analyses

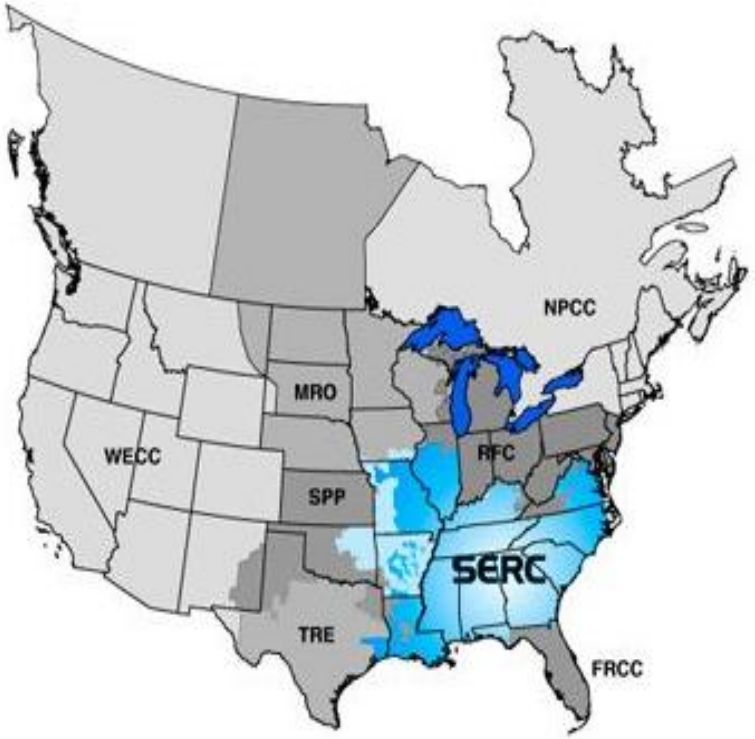
Preliminary List of Alternative Regional Transmission Projects



SERC Regional Model Development Update

- SERC is one of the eight regional electric reliability councils under the North American Electric Reliability Corporation authority (NERC).

- SERC oversees the implementation and enforcement of Reliability Standards among the bulk power system (BPS) users, owners, and operators.



SERC Regional Model Development Update

- **SERC Regional Model Development**
  - SERC Long-Term Working Group (LTWG)
    - Analyze the performance of the members' transmission systems and identify limits to power transfers occurring non-simultaneously among the SERC members.
    - Evaluate the performance of bulk power supply facilities under both normal and contingency conditions for future years.
  - Data Bank Update (DBU)
    - The DBU is held to conduct an annual update of power flow models for the SERC Region to be used for operating and future year studies.

SERC Regional Model Development Update

- **SERC Regional Model Development**
  - Eastern Interconnection Reliability Assessment Group (ERAG)
    - The SERC Models are incorporated into the power flow models of the interconnected regions and updated annually by ERAG
    - Responsible for developing a library of solved power flow models of the Eastern Interconnection (Multi-regional Modeling Work Group – MMWG).
    - The updated Regional MMWG Models serve as the starting point model for the SERTP Regional Power Flow Models
    - MOD-32 Compliance (Data for Power System Modeling and Analysis)

SERC Regional Model Development Update

- **SERC Regional Model Development**
  - LTWG Schedule of Events for 2018
    - Data Bank Update (DBU) was performed in May
    - Power flow cases were finalized in June
    - Future Study Year Case: 2022 Summer Peak Load
      - Nonpublic Study and Report to be completed in October
      - Steering Committee Report review
    - Final Report Scheduled for completion on December 4th
  - ERAG Schedule of Events for 2018
    - MMWG Model Update performed from August – September
    - Power flow cases finalized in October

Next Meeting Activities

- **2018 SERTP 4th Quarter Meeting** – *Annual Transmission Planning Summit & Input Assumptions Meeting*
  - **Location: GTC Headquarters in Atlanta, GA**
  - **Date: December 13th**
  - **Purpose:**
    - Final Economic Planning Study Results
    - Final Regional Transmission Plan
    - Regional Analyses Results
    - 2019 Assumptions Input Session

2018 SERTP

Questions?

www.southeasternrtp.com