# Southeastern Regional Transmission Planning Process

## 2010 Economic Planning Studies Final Results

**December 2010**

## Executive Summary

The Regional Planning Stakeholder Group ("RPSG") identified five Economic Planning Scenarios to be evaluated under the Southeastern Regional Transmission Planning ("SERTP") process. The SERTP Sponsors have performed analyses to assess the performance of the transmission systems of the participating Transmission Owners for these five transfer scenarios. 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 provide potential solutions to alleviate the limitations, planning-level cost estimates, and the projected need-date for projects to accommodate the power flows associated with the transfers in the five Economic Planning Scenarios. Additionally, projects are identified as potential solutions to address the identified constraints and are based on the economic 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. 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 year evaluated for the five economic studies, as selected by the stakeholders, was 2016. Each request was evaluated for that particular year.
- The load levels evaluated were Summer Peak and Shoulder

  (93% of Summer Peak load).
- The following economic transfer scenarios were assessed according to the reliability criteria of each of the participating Transmission Owners:
  - Birmingham, AL to Georgia Integrated Transmission System ("ITS") – 1000 MW
    - Year: 2016
    - Type of Transfer: Generation to Generation
    - Source: New generator interconnecting to the South Bessemer 500 kV substation near Birmingham, AL.
    - Sink: Generation within the Georgia ITS.
    - Additionally, this study provides an estimate of the transfer level, above the requested amount, that could result in a voltage instability event.
  - TVA Border to Southern Balancing Authority ("SBA") – 1500 MW

  - Year: 2016
  - Type of Transfer: Load to Generation
  - Source: Uniform load scale of the TVA area
  - Sink: Generation within the SBA

- SCPSA Border to SBA – 200 MW
  - Year: 2016
  - Type of Transfer: Load to Generation
  - Source: Uniform load scale of SCPSA area.
  - Sink: Generation within the SBA.

- Duke Border to Southern Balancing Authority ("SBA") – 2000 MW
  - Year: 2016
  - Type of Transfer: Load to Generation
  - Source: Uniform load scale of the Duke area.
  - Sink: Generation within the SBA.

- North Georgia to Mississippi – 600 MW
  - Year: 2016
  - Type of Transfer: Generation to Generation
  - Source: New Generator interconnecting to the 500 kV near Murray County, GA
  - Sink: Generation within SMEPA's and Mississippi Power Company's ("MPC") territory
    - Amount of generation to be displaced within SMEPA and MPC was determined by the load ratio of SMEPA and MPC
    - SMEPA's portion of the sink was 126 MW
    - MPC's portion of the sink was 474 MW

- PSS/E and/or MUST will be used for the study.
- Generation, interchange, and other assumptions will be coordinated between participating Transmission Owners and Stakeholders.

## Study Criteria

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

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

## Case Development

- For all evaluations, the "2010 Series, Version 2C", 2016 cases were used as a starting point for the analysis of the five economic study requests.

## 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 results on elements of 115 kV and greater within their respective service area based on:

- Thermal loadings greater than 100% (with potential solutions).
- Thermal loadings greater than 90% that increase with the addition of the transfer.
- 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 in order to identify any constraints within the participating Transmission Owners' service territory as a result of the five economic planning study requests. Any reliability 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 studies requested by the stakeholders.
- 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 construction schedules 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 five Economic Planning Studies
- For each Economic Planning Study, the results of that study including:
  1. Limits to the transfer
  2. Selected solution alternatives to address the limit
  3. Rough, planning-level cost estimates and construction schedules for the selected solution alternatives

# *Birmingham, AL to the Georgia Integrated Transmission System ("GA-ITS")*

## *1000 MW*

## Study Structure and Assumptions

| Transfer Sensitivity | Transfer Amount | Transfer Source | Transfer Sink | Study Year |
|---|---|---|---|---|
| Birmingham, AL to GA-ITS | 1000 MW | Birmingham, AL | GA-ITS | 2016 |
| **Load Flow Cases** | | | | |
| 2010 Series Version 2C Cases: Summer Peak and Shoulder (93% load level) | | | | |
| **Source Modeled** | | | | |
| The source for this transfer was assumed to be a new generator interconnecting to the existing South Bessemer 500 kV Substation near Birmingham, AL. | | | | |

### Transmission System Impacts

Tables 1.1 through Table 1.3 below identify thermal constraints attributable to the requested transfer for the contingency and scenario that resulted in the highest facility loading for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

**Table 1.1. Pass 0 – Transmission System Impacts With No Enhancements – *Southern Balancing Authority***

The following table identifies significant constraints in the Southern Balancing Authority ("SBA") without any enhancements to the transmission system. The 1000 MW transfer from Birmingham, AL to the GA-ITS results in overloads of several 230 kV facilities. Projects were first identified to alleviate these constraints before alleviating the remaining constraints because the proposed enhancements significantly alter load flow in the SBA.

| | | | Thermal Loadings (%) | | | | |
|---|---|---|---|---|---|---|---|
| **AREA** | **Limiting Element** | **Rating (MVA)** | **Without Request** | **With Request** | **Contingency** | **Scenario** | **Project** |
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 4200 BESSEMER 115 4202 BESSGRCO 230 1 | 392 | 89.1 | 110.2 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 13 | P1 |
| SBA | 4508 MONTG SS 230 5500 AUTAUG6 230 1 | 1243 | 98.2 | 109.8 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 7 | P1 |
| SBA | 125 FORTSON 230 130 GOAT ROCK 230 1 | 1192 | 99.3 | 107.1 | 130 GOAT ROCK 230 1530 CAMP MCKENZ 230 1 | 16 | P1 |
| SBA | 4965 DANWAYSS 230 5310 HILLABEE 230 1 | 602 | 94.2 | 104.7 | 5180 N.OPEL6 230 5310 HILLABEE 230 1 | 9 | P1 |
| SBA | 218 S BAINBRDGE 230 4601 FARLEY 6 230 1 | 693 | 95.5 | 104.1 | 2500 RACCOON CK 500 3021 LONGLEAF 500 1 | 24 | P1 |
| SBA | 5180 N.OPEL6 230 5310 HILLABEE 230 1 | 602 | 91.1 | 101.6 | 4965 DANWAYSS 230 5310 HILLABEE 230 1 | 9 | P1 |
| SBA | 4400 GASTON 230 4996 POWERSYS 230 1 | 497 | 89.6 | 100.8 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 18 | P1 |

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 130 GOAT ROCK 230 1530 CAMP MCKENZ 230 1 | 1204 | 93.5 | 100.8 | 125 FORTSON 230 130 GOAT ROCK 230 1 | 16 | P1 |
| SBA | 4488 N SELMA3 115 4489 N SELMA6 230 1 | 302 | 96.3 | 100.5 | 4488 N SELMA3 115 4489 N SELMA6 230 2 | 2 | P1 |
| SBA | 4598 PINCK 6 230 5138 PIKE CO6 230 1 | 478 | 87.6 | 100.3 | 4512 SNOWDN8 500 4600 FARLEY 8 500 1 | 6 | P1 |
| SBA | 125 FORTSON 230 1530 CAMP MCKENZ 230 1 | 1192 | 92.8 | 100.2 | 125 FORTSON 230 130 GOAT ROCK 230 1 | 16 | P1 |
| SBA | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 480 | 86.2 | 100.0 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 14 | P1 |

**Table 1.2. Pass 1 – Transmission System Impacts With Proposed Enhancement "P1" – *Southern Balancing Authority***

The following table identifies significant constraints in the Southern Balancing Authority ("SBA") with the proposed enhancement "P1" applied to the transmission system. Enhancements were identified to alleviate the remaining constraints.

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 2522 SONAT ELL J 230 3020 TALBOT CO 1 230 1 | 433 | 95.1 | 104.7 | 13 BONAIRE 500 2345 SMARR 500 1 | 16 | P5 |
| SBA | 461 JACKSON LK 115 1917 S COV J 115 1 | 71 | 96.4 | 104.1 | 746 S GRIFFIN 115 750 GA BRD CORR 115 1 | 15 | P3 |
| SBA | 117 WAYNESBORO 230 562 WAYNESBORO 115 1 | 280 | 99.0 | 102.2 | 117 WAYNESBORO 230 118 WADLEY PRI 230 1 | 15 | P2 |
| SBA | 4740 GKN W LD 115 5257 HALACLTP 115 1 | 107 | 97.8 | 101.7 | 4514 S MONTG3 115 4547 PINEDALE 115 1 | 6 | P6 |
| SBA | 4311 GS STEEL 115 4334 MORG XRD 115 1 | 112 | 99.2 | 101.6 | 4324 GADSDEN 115 4854 BLACK CK TP 115 1 | 27 | P4 |
| SBA | 251 E POINT B2 115 264 E POINT 4 115 1 | 187 | 99.5 | 101.2 | 240 E POINT B1 115 303 COL PK #3 J 115 1 | 3 | P7 |
| SBA | 5203 AIRPT LN 115 5706 BNTBRKTP 115 1 | 138 | 99.4 | 101.1 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 12 | P8 |

# SERTP 2010 Economic Study Results
# December 2010

**Table 1.3. Pass 2 – Transmission System Impacts With All Proposed Enhancements – *Southern Balancing Authority***

The following table identifies constraints in the Southern Balancing Authority ("SBA") with all proposed enhancements applied to the transmission system. The resulting facilities in the table below could become potential constraints in future years or with different queuing assumptions, but are not overloaded in the 2016 study year.

| | | | Thermal Loadings (%) | | | | |
|---|---|---|---|---|---|---|---|
| **AREA** | **Limiting Element** | **Rating (MVA)** | **Without Request** | **With Request** | **Contingency** | **Scenario** | **Project** |
| **The following facilities could become potential constraints in future years or with different queuing assumptions** | | | | | | | |
| SBA | 165 W BRUNSWICK 230 2592 THALMANN 2 230 1 | 509 | 99.8 | 99.9 | 2380 THAL LS1 230 2591 THALMANN 1 230 1 | 15 | -- |
| SBA | 4639 CHICK 3 115 4659 KIMCLARK 115 1 | 250 | 99.0 | 99.5 | 4655 N MOBILE 115 5159 CHKBOGSS 115 1 | 5 | -- |
| SBA | 571 SYLVANIA 115 581 KING MFG + 115 1 | 63 | 72.7 | 99.5 | 8 VOGTLE 500 9 W MCINTOSH 500 1 | 15 | -- |
| SBA | 7500 ALFORD T 115 7910 BAY CNTY 115 1 | 67 | 98.3 | 99.4 | 7310 SHOAL RV 230 7915 SHAKY JO 230 1 | 24 | -- |
| SBA | 4485 FAUNSDAL 115 4744 SONGALTP 115 1 | 138 | 93.7 | 99.2 | 4471 GREENCO6 230 4489 N SELMA6 230 1 | 19 | -- |
| SBA | 1010 BEMISS 115 1065 PINE GROVE 115 1 | 91 | 98.3 | 98.6 | 1885 W VALDOSTA 230 1886 W VALDOSTA 115 1 | 3 | -- |
| SBA | 748 SPALDING 115 876 BROOKS 115 1 | 155 | 94.3 | 98.4 | 171 OHARA 230 1629 WOOLSEY 230 1 | 3 | -- |
| SBA | 193 WOODSTOCK 230 1211 RAGSDALE RD 230 1 | 497 | 95.3 | 98.3 | 4 BULL SLUICE 500 19 BIG SHANTY 500 1 | 3 | -- |
| SBA | 1882 N CAMILLA 230 2510 RACCOON CK 230 1 | 509 | 97.0 | 97.9 | 218 S BAINBRDGE 230 4601 FARLEY 6 230 1 | 24 | -- |
| SBA | 508 LANGSTON 115 575 STATESBORO 115 1 | 124 | 87.9 | 97.6 | 843 VIDALIA 115 1625 LOOP RD 115 1 | 21 | -- |
| SBA | 581 KING MFG + 115 1483 DOVER TP 115 1 | 63 | 70.8 | 97.6 | 8 VOGTLE 500 9 W MCINTOSH 500 1 | 15 | -- |
| SBA | 129 S COWETA 230 719 S COWETA 115 1 | 400 | 95.1 | 97.5 | 16 OHARA 500 171 OHARA 230 1 | 22 | -- |
| SBA | 232 S COBB DR 115 1265 OAKDALE J 115 1 | 112 | 97.3 | 97.4 | 977 HICKS RD 115 998 W MARIETTA 115 1 | 22 | -- |
| SBA | 4113 FISH RV CAP 115 17996 FISHRVTP 115 1 | 135 | 97.1 | 97.2 | 4141 SW FOLEY 115 4641 SILVER 3 115 1 | 5 | -- |
| SBA | 363 HOPEWELL 115 1714 BIRMINGHAM 115 1 | 188 | 96.9 | 97.0 | 956 HOLLY SP 115 1722 NEWLIGHT CH 115 1 | 4 | -- |
| SBA | 4443 THURLOW 115 4445 YATESDAM 115 1 | 117 | 95.4 | 97.0 | 4534 AUB MONT 115 5136 MADPARK3 115 1 | 6 | -- |
| SBA | 960 MARIETTA 5 115 1751 SANDY PLAIN 115 1 | 187 | 96.4 | 96.9 | 322 ROSWELL 115 971 MCPHERSON 115 1 | 4 | -- |
| SBA | 741 JONESBORO 115 1911 SPIVEY LK 115 1 | 298 | 94.9 | 96.9 | 742 STOCKBRIDGE 115 1913 STOCKBRIDGE 230 1 | 3 | -- |
| SBA | 24 N TIFTON 500 222 N TIFTON 230 1 | 1536 | 94.2 | 96.6 | 2500 RACCOON CK 500 2510 RACCOON CK 230 1 | 24 | -- |
| SBA | 4200 BESSEMER 115 5060 GREENWD 115 1 | 216 | 95.1 | 96.4 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 12 | -- |
| SBA | 848 PINEGROVE 115 1464 HAZLE J 115 1 | 114 | 88.8 | 96.3 | 844 E VIDALIA 115 1476 W LYONS J2 115 1 | 26 | -- |
| SBA | 208 NELSON 230 954 NELSON 115 2 | 176 | 95.7 | 95.9 | 208 NELSON 230 954 NELSON 115 1 | 26 | -- |
| SBA | 4200 BESSEMER 115 4202 BESSGRCO 230 1 | 392 | 89.2 | 95.8 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 14 | -- |
| SBA | 5060 GREENWD 115 5203 AIRPT LN 115 1 | 216 | 94.3 | 95.6 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 12 | -- |
| SBA | 681 MITCHELL 115 682 LESTER 115 1 | 124 | 93.5 | 95.4 | 24 N TIFTON 500 222 N TIFTON 230 1 | 24 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 36 JACK MCD 230 41 PEACHTREE 230 1 | 1192 | 92.5 | 94.9 | 36 JACK MCD 230 2265 CUMBERLAND 230 1 | 4 | -- |
| SBA | 8273 HWY 11 115 8275 HBG CNTY 115 1 | 135 | 94.0 | 94.3 | 8260 28AVE TP 115 8271 HATBG SW 115 1 | 1 | -- |
| SBA | 4629 EMCSTOCK 115 4701 BARRY 3 115 1 | 212 | 93.6 | 94.3 | 4612 BREWT TP 115 4622 N BREW 3 115 1 | 5 | -- |
| SBA | 943 S ACWORTH 115 1741 WEST OAK 115 1 | 207 | 93.2 | 94.3 | 193 WOODSTOCK 230 957 WOODSTOCK 115 1 | 22 | -- |
| SBA | 612 FIRST AVE + 115 616 BLNCHARD IP 115 1 | 199 | 93.1 | 94.2 | 612 FIRST AVE + 115 1561 RIVERFRONTJ 115 1 | 7 | -- |
| SBA | 742 STOCKBRIDGE 115 1913 STOCKBRIDGE 230 1 | 344 | 92.4 | 94.2 | 741 JONESBORO 115 1911 SPIVEY LK 115 1 | 3 | -- |
| SBA | 150 BONAIRE 230 804 BONAIRE 115 2 | 400 | 79.7 | 94.2 | 150 BONAIRE 230 804 BONAIRE 115 1 | 3 | -- |
| SBA | 150 BONAIRE 230 804 BONAIRE 115 1 | 400 | 79.7 | 94.2 | 150 BONAIRE 230 804 BONAIRE 115 2 | 3 | -- |
| SBA | 4480 LIVINGST 115 4968 MANINGTP 115 1 | 91 | 93.8 | 94.1 | 4475 DEMOP TS 115 4476 CEMEX 115 1 | 20 | -- |
| SBA | 224 OFFERMAN 230 1093 OFFERMAN 115 2 | 155 | 92.8 | 94.1 | 224 OFFERMAN 230 1093 OFFERMAN 115 1 | 24 | -- |
| SBA | 1811 BUSHNELL 115 2517 LAKE BEA 115 1 | 63 | 88.6 | 94.0 | 223 DOUGLAS 230 2516 STUMP CRK 230 1 | 15 | -- |
| SBA | 693 SAWHATCHEE 115 1569 BLAKELY 1 115 1 | 135 | 93.4 | 93.8 | 692 BLAKELY 2 115 1890 YELLOWPINEJ 115 1 | 24 | -- |
| SBA | 736 OHARA 115 738 KING ST 115 1 | 187 | 92.8 | 93.8 | 310 FAIRBURN 115 1900 LINE CREEK 115 1 | 22 | -- |
| SBA | 977 HICKS RD 115 993 FONTAINE J 115 1 | 135 | 93.6 | 93.7 | 216 JACK MCD2 115 232 S COBB DR 115 1 | 4 | -- |
| SBA | 160 HATCH + 230 164 UNION SCHL 230 1 | 509 | 92.0 | 93.7 | 15 THALMANN 500 2380 THAL LS1 230 1 | 24 | -- |
| SBA | 4475 DEMOP TS 115 4744 SONGALTP 115 1 | 159 | 88.8 | 93.7 | 4471 GREENCO6 230 4489 N SELMA6 230 1 | 19 | -- |
| SBA | 615 VICTORY DR 115 616 BLNCHARD IP 115 1 | 199 | 92.5 | 93.6 | 612 FIRST AVE + 115 1561 RIVERFRONTJ 115 1 | 6 | -- |
| SBA | 66 SCOTTDALE 230 357 SCOTTDALE 115 1 | 280 | 92.5 | 93.2 | 379 MORELAND AV 115 1215 R_GRADY 115 1 | 3 | -- |
| SBA | 74 MORROW 230 2684 POLEBRDGE A 230 1 | 539 | 82.9 | 93.5 | 73 KLONDIKE 230 1919 R_KLONDIKE 230 1 | 3 | -- |
| SBA | 4753 PCLEARTP 115 4956 FAIRHCAP 115 1 | 91 | 93.2 | 93.3 | 4141 SW FOLEY 115 4641 SILVER 3 115 1 | 5 | -- |
| SBA | 4988 S.JEFF 3 115 5041 BLUELKNL 115 1 | 212 | 93.1 | 93.2 | 4292 NHELENA3 115 4816 VALDAL34 115 1 | 13 | -- |
| SBA | 4475 DEMOP TS 115 4832 NAHEO SS 115 1 | 112 | 92.0 | 93.1 | 4470 GREENCO3 115 5243 BW-BOGUE 115 1 | 1 | -- |
| SBA | 621 YATES 115 1551 CLEM 115 1 | 155 | 89.2 | 93.1 | 2469 BRIGHT STAR 230 2480 YELLOW DIRT 230 1 | 17 | -- |
| SBA | 938 CARTERVL 4 115 983 CARTERVL 1J 115 1 | 269 | 92.6 | 92.9 | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 22 | -- |
| SBA | 1055 BARNEYVILLE 115 1883 ADEL 1J 115 1 | 142 | 92.3 | 92.6 | 220 PINE GROVE 230 222 N TIFTON 230 1 | 24 | -- |
| SBA | 4292 NHELENA3 115 4816 VALDAL34 115 1 | 212 | 92.3 | 92.5 | 4988 S.JEFF 3 115 5041 BLUELKNL 115 1 | 13 | -- |
| SBA | 224 OFFERMAN 230 1093 OFFERMAN 115 1 | 160 | 91.2 | 92.5 | 224 OFFERMAN 230 1093 OFFERMAN 115 2 | 24 | -- |
| SBA | 4534 AUB MONT 115 5136 MADPARK3 115 1 | 216 | 87.3 | 92.5 | 23 WANSLEY 500 5123 BILLNGSS 500 1 | 10 | -- |
| SBA | 4485 FAUNSDAL 115 5305 BROWN TP 115 1 | 138 | 86.7 | 92.2 | 4471 GREENCO6 230 4489 N SELMA6 230 1 | 19 | -- |
| SBA | 309 FIFE 115 311 OWENS 2 TAP 115 1 | 79 | 89.1 | 92.1 | 621 YATES 115 1551 CLEM 115 1 | 22 | -- |
| SBA | 935 CARTERSVL 115 938 CARTERVL 4 115 1 | 298 | 91.7 | 92.0 | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 22 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 4361 MCADORTP 115 5706 BNTBRKTP 115 1 | 138 | 90.0 | 91.9 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 12 | -- |
| SBA | 289 MURRAY LK J 115 297 MORROW 115 1 | 135 | 87.8 | 91.9 | 285 GRADY 3 115 286 GRADY 1&2 115 1 | 4 | -- |
| SBA | 170 S GRIFFIN 230 746 S GRIFFIN 115 1 | 298 | 88.0 | 91.6 | 736 OHARA 115 739 BONANZA 115 1 | 3 | -- |
| SBA | 1627 FRITO LAY + 115 2263 WATERFORD 115 1 | 124 | 44.1 | 91.6 | 150 BONAIRE 230 1603 KATHLEEN 230 1 | 7 | -- |
| SBA | 164 UNION SCHL 230 224 OFFERMAN 230 1 | 509 | 89.9 | 91.5 | 15 THALMANN 500 2380 THAL LS1 230 1 | 24 | -- |
| SBA | 4329 LOOK MTN 115 4331 ATTALLA3 115 1 | 112 | 88.8 | 91.5 | 4324 GADSDEN 115 5289 ELMWOOD 115 1 | 27 | -- |
| SBA | 4338 CED COVE 115 5037 MERCEDES 115 1 | 159 | 91.3 | 91.4 | 4919 CAFJCTTP 115 5036 S BESS 3 115 1 | 11 | -- |
| SBA | 130 GOAT ROCK 230 3023 FRANKLIN 1 230 1 | 1244 | 91.1 | 91.2 | Base Case | 26 | -- |
| SBA | 144 COTTON 230 1882 N CAMILLA 230 1 | 509 | 90.3 | 91.2 | 218 S BAINBRDGE 230 4601 FARLEY 6 230 1 | 24 | -- |
| SBA | 228 LOCKWIND J 115 1707 MAR 12 J 115 1 | 155 | 91.0 | 91.1 | 216 JACK MCD2 115 231 KING SP RD 115 1 | 4 | -- |
| SBA | 5257 HALACLTP 115 17995 HARDWYTP 115 1 | 107 | 86.1 | 91.0 | 4514 S MONTG3 115 4547 PINEDALE 115 1 | 6 | -- |
| SBA | 4189 PRATCTY3 115 4190 PRATCTY6 230 1 | 398 | 90.0 | 90.9 | 5144 ACIPCO6 230 5145 ACIPCO3 115 1 | 13 | -- |
| SBA | 8560 WGNS 5AV 115 8562 COASTPAP 115 1 | 107 | 90.7 | 90.8 | 8530 LANDON 115 8532 HWY 53 115 1 | 27 | -- |
| SBA | 1109 SPRING CRK 115 1822 PINEHILL J1 115 1 | 79 | 89.0 | 90.8 | 1109 SPRING CRK 115 2527 FLOYDTOWN 115 1 | 24 | -- |
| SBA | 26 UNION CITY 230 74 MORROW 230 1 | 497 | 84.7 | 90.8 | 26 UNION CITY 230 74 MORROW 230 2 | 3 | -- |
| SBA | 270 ATKINSON + 115 1976 AWW-BD J 115 1 | 199 | 88.6 | 90.7 | 211 HEMPHILL AJ 115 275 NORTHWEST 115 1 | 3 | -- |
| SBA | 4240 LEEDSTS3 115 4762 LEHGH TP 115 1 | 212 | 90.0 | 90.7 | 4233 CLAY 3 115 4246 SPRINGVL 115 1 | 17 | -- |
| SBA | 8245 PETAL 115 8251 HATBG NO 115 1 | 155 | 89.9 | 90.7 | 8271 HATBG SW 115 8273 HWY 11 115 1 | 1 | -- |
| SBA | 2408 ETOWAH 115 2435 REAVIS MTN 115 1 | 124 | 87.9 | 88.8 | 88 MCGRAU FORD 230 335 DAWSON CROS 230 1 | 26 | -- |
| SBA | 1096 LOWNDES 115 1886 W VALDOSTA 115 1 | 187 | 89.5 | 90.6 | 220 PINE GROVE 230 1885 W VALDOSTA 230 1 | 16 | -- |
| SBA | 1035 E BAINBRDGE 115 2515 PROPEX J 115 1 | 79 | 88.7 | 90.5 | 1109 SPRING CRK 115 2527 FLOYDTOWN 115 1 | 24 | -- |
| SBA | 1822 PINEHILL J1 115 2515 PROPEX J 115 1 | 79 | 88.7 | 90.5 | 1109 SPRING CRK 115 2527 FLOYDTOWN 115 1 | 24 | -- |
| SBA | 933 BOWEN 115 1787 BROWN FARMJ 115 1 | 155 | 87.8 | 90.5 | 196 CARTERSVL 230 935 CARTERSVL 115 2 | 22 | -- |
| SBA | 4700 BARRY 6 230 7057 ECUA 230 1 | 602 | 89.5 | 90.2 | 4638 CHICK 6 230 4700 BARRY 6 230 1 | 5 | -- |
| SBA | 208 NELSON 230 954 NELSON 115 1 | 180 | 90.0 | 90.2 | 208 NELSON 230 954 NELSON 115 2 | 26 | -- |
| SBA | 286 GRADY 1&2 115 1215 R_GRADY 115 1 | 249 | 87.5 | 90.1 | 66 SCOTTDALE 230 357 SCOTTDALE 115 1 | 3 | -- |

**Scenario Explanations:**

1) Barry Unit #5 Offline, Summer Peak Case
2) Barry Unit #5 Offline, Shoulder (93% Load Level) Case
3) Branch Unit #4 Offline, Summer Peak Case
4) Bowen Unit #4 Offline, Summer Peak Case
5) Crist Unit #7 Offline, Summer Peak Case
6) Farley Unit #1 Offline, Summer Peak Case
7) Farley Unit #2 Offline, Summer Peak Case
8) Farley Unit #2 Offline, Shoulder (93% Load Level) Case
9) Franklin Unit #2 Offline, Summer Peak Case
10) Franklin Unit #2 Offline, Shoulder (93% Load Level) Case
11) Gorgas Unit #10 Offline, Summer Peak Case
12) Gorgas Unit #10 Offline, Shoulder (93% Load Level) Case
13) Gaston Unit #5 Offline, Summer Peak Case
14) Gaston Unit #5 Offline, Shoulder (93% Load Level) Case
15) Hatch Unit #1 Offline, Summer Peak Case
16) Hatch Unit #2 Offline, Summer Peak Case
17) Hammond Unit #4 Offline, Shoulder (93% Load Level) Case
18) Harris Unit #1 Offline, Summer Peak Case
19) Harris Unit #1 Offline, Shoulder (93% Load Level) Case
20) Kemper Offline, Summer Peak Case
21) Kraft Unit #3 Offline, Summer Peak Case
22) McDonough Unit #5 Offline, Summer Peak Case
23) Miller Unit #1 Offline, Summer Peak Case
24) Smith Unit #3 Offline, Summer Peak Case
25) Vogtle Unit #1 Offline, Summer Peak Case
26) Vogtle Unit #2 Offline, Summer Peak Case
27) Watson Unit #5 Offline, Summer Peak Case

## Stability Impacts

Stability assessments were performed to determine the impact of delivering 1000 MW from South Bessemer 500 kV substation to the GA-ITS in 2016. The assessments included all transmission enhancements identified in the thermal and interface analysis. No stability related impacts attributable to the Birmingham, AL to GA-ITS transfer of 1000 MW were identified.

An additional aspect of this study was to provide an estimate of the transfer level, above the requested amount of 1000 MW that could result in a wide-area voltage instability event. In order to provide this transfer level estimate, 100 MW incremental increases of generation at South Bessemer 500 kV substation were evaluated:

- 2400 MW were able to be transferred from South Bessemer 500 kV substation to the GA-ITS **without** any of the transmission enhancements identified in the thermal and interface analysis of the transfer included in this estimate.
- 3000 MW were able to be transferred from South Bessemer 500 kV substation to the GA-ITS **with** the transmission enhancements identified in the thermal and interface analysis of the transfer included in this estimate.

## Birmingham, AL to the GA-ITS: Transfer Flows within the SERTP

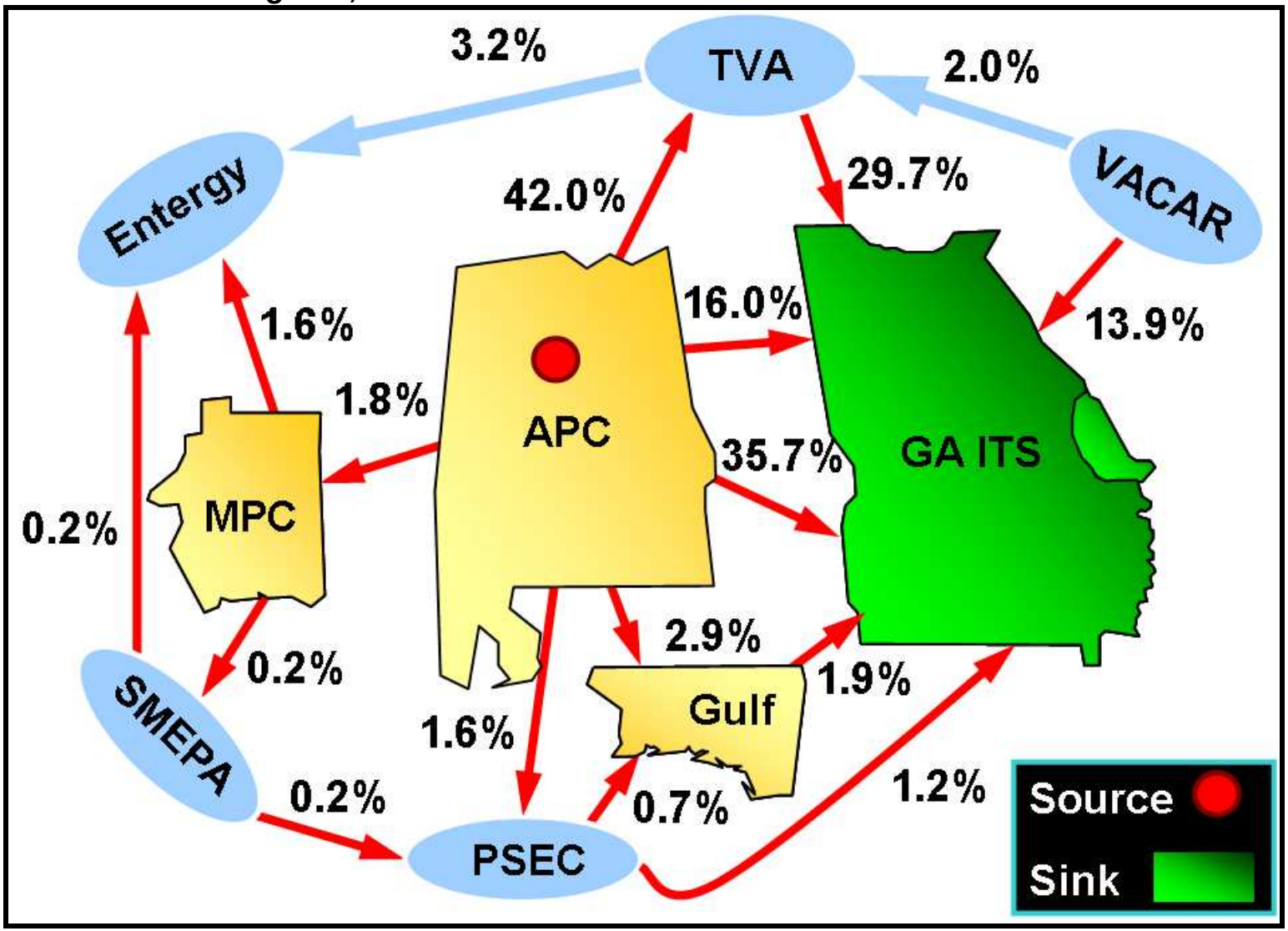
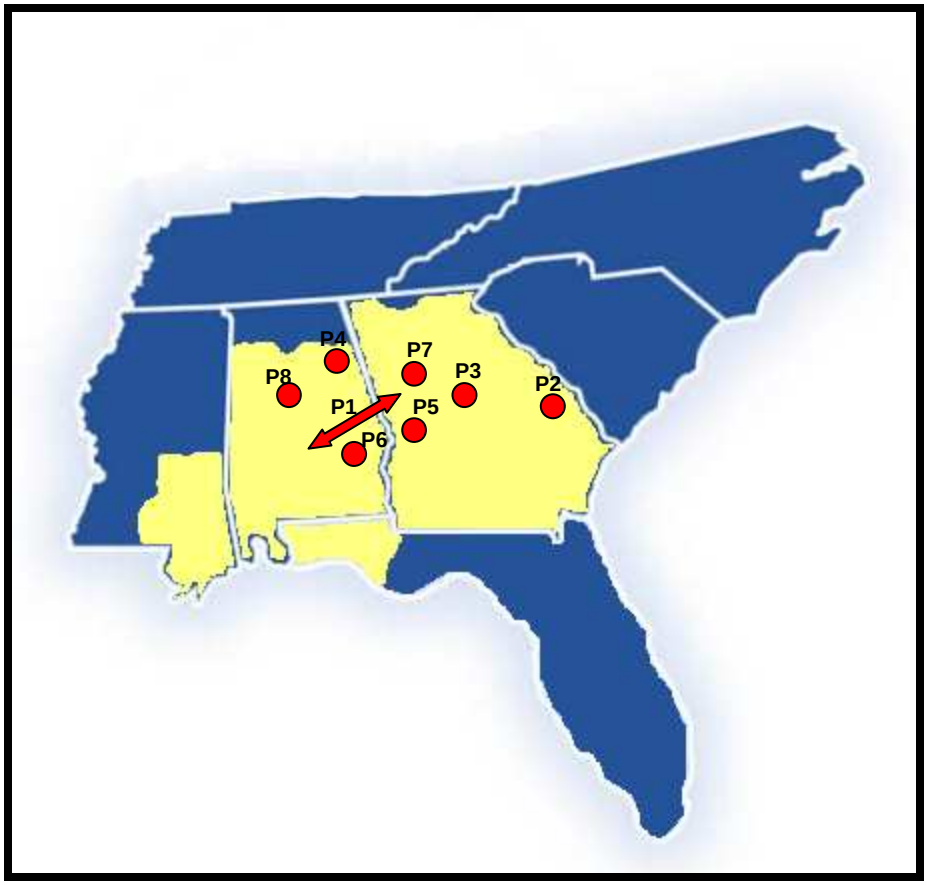


**Table 1.4. Potential Solutions for Identified Constraints – *Southern Balancing Authority***
The following projects are potential solutions to address the identified constraints and are based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur, and would impact the results of this study. In addition, the current projected enhancements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission system expansion plans could also impact the results of this study. These potential solutions only address constraints identified within the Southern Balancing Area that are associated with the proposed transfer. Other Balancing Areas were not monitored which could result in additional limitations and required system improvements.

| Item | Potential Solution | Estimated Need Date | Estimated Cost |
|---|---|---|---|
| **P1** | • Construct approximately 100 miles of new 3-1113 ACSR 500 kV transmission line at 100 ºC from Billingsley to Wansley. | 2016 | $286,000,000 |
| **P2** | • Install a 400 MVA 230 / 115 kV transformer at Waynesboro Substation | 2016 | $6,300,000 |
| **P3** | • Upgrade approximately 5.6 miles of 397 ACSR from 50 ºC to 100 ºC from Jackson Lake to South Covington. | 2016 | $1,100,000 |
| **P4** | • Upgrade approximately 2.5 miles of 397 ACSR from 75 ºC to 100 ºC from Gulf States Steel to Morgans Crossroads. | 2016 | $500,000 |
| **P5** | • Reconductor approximately 8.5 miles with 1033 ACSR 230 kV transmission line at 100 ºC from Southern Natural Gas to Talbot County #1. | 2016 | $7,500,000 |
| **P6** | • Reconductor approximately 3.1 miles with 795 ACSR 115 kV transmission line at 100 ºC from Halla Climate Control to Gkn Westalnd Aerospace. | 2016 | $1,100,000 |
| **P7** | • Reconductor approximately 2.7 miles with 1033 ACSR 115 kV transmission line at 100 ºC from Willingham Drive to East Point. | 2016 | $2,400,000 |
| **P8** | • Reconductor approximately 0.34 miles with 1033 ACSR 115 kV transmission line at 100 ºC from Bent Brook to Airport Lane. | 2016 | $300,000 |
| **TOTAL (2016$)** | | | **$305,200,000** |

**Diagram 1.1. Approximate Location of Potential Solutions**



## Interchange Assumptions

**Table 1.5. Transactions Modeled in Starting Point Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *735231* | *SOCO* | *Duke* | *50* |
| *735232* | *SOCO* | *Duke* | *25* |
| *823644* | *SOCO* | *Duke* | *90* |
| *823646* | *SOCO* | *Duke* | *90* |
| *787707* | *SOCO* | *TVA* | *73* |
| *672440* | *TVA* | *SOCO* | *208* |
| *77603* | *SOCO* | *PSEC* | *114* |
| *765080* | *PSEC* | *SOCO* | *1092* |
| -- | *SOCO* | *PSEC* | *5* |
| -- | *MEAG* | *PSEC* | *62* |
| -- | *GTC* | *PSEC* | *30* |
| -- | *SOCO* | *PSEC* | *267* |
| -- | *SEPA* | *SOCO* | *681* |
| -- | *SBA* | *FRCC* | *2435 / 3700*[(1)] |

[(1)]Southern performed studies with both 2435 MW and 3700 MW of interchange between Florida and the SBA

**Table 1.6. Additional Transactions Modeled in Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *869848* | *EES* | *SOCO* | *150* |
| *814051* | *EES* | *SOCO* | *50* |
| *854479* | *EES* | *SOCO* | *196* |
| *705288* | *EES* | *Duke* | *50* |
| *705289* | *EES* | *Duke* | *100* |
| *869847* | *Duke* | *SOCO* | *50* |
| *147617* | *SC* | *GTC* | *296* |
| *147616* | *SCEG* | *GTC* | *285* |
| *147615* | *Duke* | *GTC* | *465* |
| *147613* | *TVA* | *GTC* | *310* |
| *72133712* | *Duke* | *MEAG* | *50* |

**Table 1.7. Capacity Benefit Margin Modeled (CBM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *Duke* | *310* |
| *Southern* | *TVA* | *400* |
| *Southern* | *EES* | *100* |
| *Southern* | *SCPSA* | *120* |
| *Southern* | *SCEG* | *120* |
| *GTC* | *TVA* | *221* |
| *GTC* | *Duke* | *104* |
| *GTC* | *SCEG* | *47* |
| *GTC* | *SCPSA* | *28* |

For more information on Southern's CBM, click here.
For more information on GTC's CBM, click here.

**Table 1.8. Transmission Reliability Margins Modeled (TRM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *From Duke* | *199.46* |
| *GTC* | *From Duke* | *100.65* |
| *MEAG* | *From Duke* | *26.26* |
| *Dalton* | *From Duke* | *3.53* |
| *Southern* | *From Entergy* | *205.01* |
| *Southern* | *From TVA* | *233.43* |
| *GTC* | *From TVA* | *48.57* |
| *MEAG* | *From TVA* | *12.67* |
| *Dalton* | *From TVA* | *1.70* |

For more information on the Southern Balancing Authority's TRM, click here.

# *TVA Border to the Southern Balancing Authority ("SBA")*

# *1500 MW*

## Study Structure and Assumptions

| Transfer Sensitivity | Transfer Amount | Transfer Source | Transfer Sink | Study Year |
|---|---|---|---|---|
| TVA Border to SBA | 1500 MW | TVA | SBA | 2016 |
| **Load Flow Cases** | | | | |
| 2010 Series Version 2C Cases: Summer Peak and Shoulder (93% load level) | | | | |
| **Source Modeled** | | | | |
| The source for this transfer was a uniform load reduction in TVA | | | | |

### Transmission System Impacts

Tables 2.1 through 2.3 below identify thermal constraints attributable to the requested transfer for the contingency and scenario that resulted in the highest facility loading for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

**Table 2.1. Pass 0 – Transmission System Impacts With No Enhancements – *Southern Balancing Authority***

The following table identifies significant constraints in the Southern Balancing Authority ("SBA") without any enhancements to the transmission system. The 1500 MW transfer from TVA to the SBA results in overloads of several 230 kV and 115 kV facilities. Projects were first identified to alleviate major problems within the SBA because the proposed enhancements significantly alter load flow in the SBA.

| | | | Thermal Loadings (%) | | | | |
|---|---|---|---|---|---|---|---|
| AREA | Limiting Element | Rating (MVA) | Without Request | With Request | Contingency | Scenario | Project |
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 4332 ATTALLA5 161 360283 5ALBERTVILLE161 1 | 193 | 82.7 | 124.8 | 4234 CLAY 6 230 4247 ONEONTA6 230 1 | 3 | P1 |
| SBA | 4331 ATTALLA3 115 4332 ATTALLA5 161 1 | 99 | 63.0 | 121.2 | 4331 ATTALLA3 115 4332 ATTALLA5 161 2 | 3 | P1 |
| SBA | 916 CALHOUN RD 115 917 CELANESE 115 1 | 79 | 94.8 | 117.4 | 181 ROCKY MTN 230 182 HAMMOND 230 1 | 5 | P2 |
| SBA | 4331 ATTALLA3 115 4332 ATTALLA5 161 2 | 111 | 75.5 | 114.0 | 4234 CLAY 6 230 4247 ONEONTA6 230 1 | 3 | P1 |
| SBA | 4399 DELTA 115 5199 FRIENDSH 115 1 | 113 | 98.7 | 112.2 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 2 | P3 |
| SBA | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 2598 | 92.6 | 110.6 | 11 S HALL 500 306105 8OCONEE 500 1 | 1 | N/A[1] |
| SBA | 104 LEXINGTON 230 339100 6RUSSEL 230 1 | 596 | 94.9 | 108.9 | 11 S HALL 500 306105 8OCONEE 500 1 | 8 | P4 |
| SBA | 4399 DELTA 115 4401 LINEVILL 115 1 | 113 | 95.0 | 108.5 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 2 | P3 |
| SBA | 4965 DANWAYSS 230 5310 HILLABEE 230 1 | 602 | 99.4 | 105.4 | 5180 N.OPEL6 230 5310 HILLABEE 230 1 | 1 | P5 |

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 471 N LAVONIA 115 2405 TNS JS 115 1 | 216 | 98.0 | 104.1 | 94 BIO 230 105 VANNA 230 1 | 8 | P4 |
| SBA | 4410 SUNLEVTP 115 5059 KELLYTON 115 1 | 113 | 93.8 | 104.2 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 2 | P6 |
| SBA | 2035 S HALL 230 3067 CANDLER 230 1 | 509 | 91.4 | 102.7 | 3 NORCROSS 500 11 S HALL 500 1 | 8 | P4 |
| SBA | 5180 N.OPEL6 230 5310 HILLABEE 230 1 | 602 | 96.3 | 102.2 | 4965 DANWAYSS 230 5310 HILLABEE 230 1 | 1 | P5 |
| SBA | 193 WOODSTOCK 230 1211 RAGSDALE RD 230 1 | 497 | 98.2 | 101.6 | 4 BULL SLUICE 500 19 BIG SHANTY 500 1 | 11 | P7 |
| SBA | 2522 SONAT ELL J 230 3020 TALBOT CO 1 230 1 | 433 | 98.1 | 101.3 | 13 BONAIRE 500 2345 SMARR 500 1 | 4 | P8 |
| SBA | 208 NELSON 230 954 NELSON 115 2 | 176 | 97.8 | 100.8 | 208 NELSON 230 954 NELSON 115 1 | 11 | P4 |
| SBA | 4400 GASTON 230 4996 POWERSYS 230 1 | 497 | 97.8 | 100.2 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 6 | P5 |

(1) The limiting element of this 500 kV tie-line constraint is located within TVA.

Scenario Explanations:

1) Bowen Unit #4 Offline, Summer Peak Case
2) Farley Unit #2 Offline, Shoulder Case
3) Gadsden Unit #2 Offline, Shoulder (93% Load Level) Case
4) Hatch Unit #2 Offline, Summer Peak Case
5) Hammond Unit #4 Offline, Summer Peak Case
6) Harris Unit #1 Offline, Summer Peak Case
7) Kemper Unit Offline, Shoulder (93% Load Level) Case
8) McDonough Unit #5 Offline, Summer Peak Case
9) Scherer Unit #1 Offline, Summer Peak Case
10) Scholz Unit #2 Offline, Shoulder (93% Load Level) Case
11) Vogtle Unit #2 Offline, Summer Peak Case

**Table 2.2. Pass 1 – Transmission System Impacts With Proposed Enhancements P1 through P9 – *Southern Balancing Authority***

The following table identifies constraints in the Southern Balancing Authority ("SBA") with the proposed enhancements "P1" through "P9" applied to the transmission system. Enhancements were identified in order to alleviate the remaining constraints within the SBA.

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 4311 GS STEEL 115 5069 NRAINBOW 115 1 | 112 | 57.4 | 123.6 | 4323 EGADSDEN 115 4324 GADSDEN 115 1 | 5 | P10 |
| SBA | 5069 NRAINBOW 115 5419 KEYSTONE TP 115 1 | 112 | 43.3 | 110.0 | 4323 EGADSDEN 115 4324 GADSDEN 115 1 | 5 | P10 |
| SBA | 4311 GS STEEL 115 4331 ATTALLA3 115 1 | 138 | 50.7 | 107.5 | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 2 | P9 |
| SBA | 4310 RAINBOW 115 5419 KEYSTONE TP 115 1 | 112 | 37.5 | 104.5 | 4323 EGADSDEN 115 4324 GADSDEN 115 1 | 5 | P10 |
| SBA | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 2598 | 92.6 | 101.8 | 11 S HALL 500 306105 8OCONEE 500 1 | 1 | N/A(1) |

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 4489 N SELMA6 230 5500 AUTAUG6 230 1 | 404 | 78.2 | 101.1 | 4374 S.BESS 6 230 4375 S.BESS 8 500 1 | 4 | P11 |

(1) The limiting element of this 500 kV tie-line constraint is located within TVA.

Scenario Explanations:

1) Bowen Unit #4 Offline, Summer Peak Case
2) Gadsden Unit #2 Offline, Shoulder (93% Load Level) Case
3) Gaston Unit #5 Offline, Summer Peak Case
4) Kemper Unit Offline, Shoulder (93% Load Level) Case
5) Scholz Unit #2 Offline, Shoulder (93% Load Level) Case

**Table 2.3. Pass 2 – Transmission System Impacts With All Proposed Enhancements – *Southern Balancing Authority***

The following table identifies constraints in the Southern Balancing Authority ("SBA") with all proposed enhancements applied to the transmission system. The resulting facilities in the table below could become potential constraints in future years or with different queuing assumptions, but are not overloaded in the 2016 study year.

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| **The following facilities could become potential constraints in future years or with different queuing assumptions** | | | | | | | |
| SBA | 4412 ALEX TAP 115 5059 KELLYTON 115 1 | 113 | 91.7 | 100.0 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 6 | -- |
| SBA | 165 W BRUNSWICK 230 2592 THALMANN 2 230 1 | 509 | 99.6 | 99.8 | 2380 THAL LS1 230 2591 THALMANN 1 230 1 | 10 | -- |
| SBA | 4537 CARTHILL 115 4538 HOLT ST 115 1 | 135 | 95.8 | 99.4 | 4510 W MONTG3 115 4527 MAX AFB 115 1 | 23 | -- |
| SBA | 208 NELSON 230 954 NELSON 115 2 | 176 | 97.8 | 99.1 | 208 NELSON 230 954 NELSON 115 1 | 21 | -- |
| SBA | 4612 BREWT TP 115 4622 N BREW 3 115 1 | 243 | 99.0 | 99.1 | 4629 EMCSTOCK 115 4701 BARRY 3 115 1 | 5 | -- |
| SBA | 4200 BESSEMER 115 5060 GREENWD 115 1 | 216 | 96.3 | 98.7 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 14 | -- |
| SBA | 434 LAWRENCEVL 115 1363 LAWRNCEVL 3 115 1 | 188 | 97.0 | 98.6 | 1937 BAY CREEK 115 2070 LAWVL 4J 115 1 | 21 | -- |
| SBA | 1010 BEMISS 115 1065 PINE GROVE 115 1 | 91 | 98.5 | 98.6 | 1885 W VALDOSTA 230 1886 W VALDOSTA 115 1 | 11 | -- |
| SBA | 4428 MITCHDAM 115 4733 CRH TAP 115 1 | 138 | 84.7 | 98.1 | 4489 N SELMA6 230 5500 AUTAUG6 230 1 | 13 | -- |
| SBA | 318004 PURVIS 161 318007 5MOROW161 161 1 | 296 | 93.4 | 98.0 | 318004 PURVIS 161 318007 5MOROW161 161 2 | 22 | -- |
| SBA | 318004 PURVIS 161 318007 5MOROW161 161 2 | 296 | 93.3 | 97.9 | 318004 PURVIS 161 318007 5MOROW161 161 1 | 22 | -- |
| SBA | 748 SPALDING 115 876 BROOKS 115 1 | 155 | 96.4 | 97.9 | 171 OHARA 230 1629 WOOLSEY 230 1 | 20 | -- |
| SBA | 5060 GREENWD 115 5203 AIRPT LN 115 1 | 216 | 95.6 | 97.9 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 14 | -- |
| SBA | 363 HOPEWELL 115 1714 BIRMINGHAM 115 1 | 188 | 97.5 | 97.8 | 956 HOLLY SP 115 1722 NEWLIGHT CH 115 1 | 3 | -- |
| SBA | 4200 BESSEMER 115 4202 BESSGRCO 230 1 | 392 | 93.8 | 97.6 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 8 | -- |
| SBA | 4430 BOULDDAM 115 4518 ELMORE 115 1 | 171 | 88.2 | 97.0 | 4529 FORBESRD 115 5067 WET DSTP 115 1 | 24 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 4310 RAINBOW 115 5415 N CEDAR TP 115 1 | 112 | 29.1 | 97.3 | 4323 EGADSDEN 115 4324 GADSDEN 115 1 | 18 | -- |
| SBA | 4612 BREWT TP 115 4627 FLOMATON 115 1 | 212 | 97.1 | 97.2 | 4629 EMCSTOCK 115 4701 BARRY 3 115 1 | 5 | -- |
| SBA | 938 CARTERVL 4 115 983 CARTERVL 1J 115 1 | 269 | 95.2 | 97.1 | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 16 | -- |
| SBA | 4504 CLANT TP 115 4733 CRH TAP 115 1 | 138 | 83.7 | 97.1 | 4489 N SELMA6 230 5500 AUTAUG6 230 1 | 13 | -- |
| SBA | 4189 PRATCTY3 115 4190 PRATCTY6 230 1 | 398 | 92.3 | 96.8 | 5144 ACIPCO6 230 5145 ACIPCO3 115 1 | 8 | -- |
| SBA | 688 SLAPPEY DR 115 1566 ALBANY 2J 115 1 | 155 | 90.7 | 96.7 | 1519 ALBANY 7J 115 1567 ALBANY 7 115 1 | 17 | -- |
| SBA | 741 JONESBORO 115 1911 SPIVEY LK 115 1 | 298 | 96.2 | 96.5 | 742 STOCKBRIDGE 115 1913 STOCKBRIDGE 230 1 | 20 | -- |
| SBA | 1882 N CAMILLA 230 2510 RACCOON CK 230 1 | 509 | 96.4 | 96.5 | 218 S BAINBRDGE 230 4601 FARLEY 6 230 1 | 19 | -- |
| SBA | 1811 BUSHNELL 115 2517 LAKE BEA 115 1 | 63 | 95.1 | 96.3 | 223 DOUGLAS 230 2516 STUMP CRK 230 1 | 10 | -- |
| SBA | 4629 EMCSTOCK 115 4701 BARRY 3 115 1 | 212 | 95.4 | 96.0 | 4612 BREWT TP 115 4622 N BREW 3 115 1 | 5 | -- |
| SBA | 935 CARTERSVL 115 938 CARTERVL 4 115 1 | 298 | 94.1 | 95.9 | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 16 | -- |
| SBA | 911 ARMUCHEE J 115 914 GALEY&LORD+ 115 1 | 96 | 92.4 | 95.9 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 12 | -- |
| SBA | 914 GALEY&LORD+ 115 915 PINSON 115 1 | 96 | 92.4 | 95.9 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 12 | -- |
| SBA | 4361 MCADORTP 115 5706 BNTBRKTP 115 1 | 138 | 92.0 | 95.7 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 14 | -- |
| SBA | 571 SYLVANIA 115 581 KING MFG + 115 1 | 63 | 91.2 | 95.4 | 8 VOGTLE 500 9 W MCINTOSH 500 1 | 10 | -- |
| SBA | 681 MITCHELL 115 682 LESTER 115 1 | 124 | 94.7 | 95.1 | 24 N TIFTON 500 222 N TIFTON 230 1 | 10 | -- |
| SBA | 4425 JORDN DM 115 4430 BOULDDAM 115 2 | 138 | 81.2 | 94.5 | 4425 JORDN DM 115 4430 BOULDDAM 115 1 | 24 | -- |
| SBA | 848 PINEGROVE 115 1464 HAZLE J 115 1 | 114 | 93.0 | 94.8 | 844 E VIDALIA 115 1476 W LYONS J2 115 1 | 21 | -- |
| SBA | 4192 USS #8 115 4916 APEX DS 115 1 | 108 | 88.9 | 94.5 | 4153 GORGAS#1 115 5707 EP SHORT 115 1 | 8 | -- |
| SBA | 4534 AUB MONT 115 5344 MCLEMORE TP 115 1 | 216 | 90.9 | 94.4 | 3021 LONGLEAF 500 4600 FARLEY 8 500 1 | 4 | -- |
| SBA | 95 WINDER P 230 2021 CLARKSBORO 230 1 | 433 | 68.9 | 94.4 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | -- |
| SBA | 150 BONAIRE 230 804 BONAIRE 115 1 | 400 | 93.0 | 94.1 | 150 BONAIRE 230 804 BONAIRE 115 2 | 2 | -- |
| SBA | 150 BONAIRE 230 804 BONAIRE 115 2 | 400 | 93.0 | 94.1 | 150 BONAIRE 230 804 BONAIRE 115 1 | 2 | -- |
| SBA | 4156 MILLER6 230 4172 BOYLESM1 230 1 | 602 | 86.9 | 94.0 | 4157 MILLER8 500 5312 CLAY 8 500 1 | 8 | -- |
| SBA | 4189 PRATCTY3 115 4261 ALAMETAL 115 1 | 246 | 86.7 | 94.0 | 4157 MILLER8 500 5312 CLAY 8 500 1 | 8 | -- |
| SBA | 4260 SO PARK 115 4261 ALAMETAL 115 1 | 246 | 86.4 | 93.7 | 4157 MILLER8 500 5312 CLAY 8 500 1 | 8 | -- |
| SBA | 742 STOCKBRIDGE 115 1913 STOCKBRIDGE 230 1 | 344 | 93.4 | 93.6 | 741 JONESBORO 115 1911 SPIVEY LK 115 1 | 20 | -- |
| SBA | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 400 | 92.8 | 93.6 | 935 CARTERSVL 115 938 CARTERVL 4 115 1 | 16 | -- |
| SBA | 4374 S.BESS 6 230 4950 DUNCANVL 230 1 | 502 | 72.7 | 93.6 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 13 | -- |
| SBA | 8702 DANIEL 230 8705 MSPT EFR 230 1 | 866 | 91.0 | 93.6 | 4642 BIG CK 6 230 8702 DANIEL 230 1 | 1 | -- |
| SBA | 581 KING MFG + 115 1483 DOVER TP 115 1 | 63 | 89.3 | 93.5 | 8 VOGTLE 500 9 W MCINTOSH 500 1 | 10 | -- |
| SBA | 4988 S.JEFF 3 115 5041 BLUELKNL 115 1 | 212 | 93.1 | 93.4 | 4292 NHELENA3 115 4816 VALDAL34 115 1 | 8 | -- |
| SBA | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 480 | 89.7 | 93.4 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 9 | -- |
| SBA | 508 LANGSTON 115 575 STATESBORO 115 1 | 124 | 93.1 | 93.3 | 843 VIDALIA 115 1625 LOOP RD 115 1 | 15 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 208 NELSON 230 954 NELSON 115 1 | 180 | 91.9 | 93.2 | 208 NELSON 230 954 NELSON 115 2 | 21 | -- |
| SBA | 160 HATCH + 230 164 UNION SCHL 230 1 | 509 | 92.5 | 92.9 | 15 THALMANN 500 2380 THAL LS1 230 1 | 19 | -- |
| SBA | 4292 NHELENA3 115 4816 VALDAL34 115 1 | 212 | 92.4 | 92.6 | 4988 S.JEFF 3 115 5041 BLUELKNL 115 1 | 8 | -- |
| SBA | 198 PINSON 230 2434 KINGSTON 230 1 | 664 | 85.0 | 92.6 | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 3 | -- |
| SBA | 4443 THURLOW 115 4924 MTVMILTP 115 1 | 138 | 91.7 | 92.4 | 3021 LONGLEAF 500 4600 FARLEY 8 500 1 | 3 | -- |
| SBA | 2035 S HALL 230 3067 CANDLER 230 1 | 509 | 91.4 | 92.3 | 3 NORCROSS 500 11 S HALL 500 1 | 16 | -- |
| SBA | 672 ALBANY 9 115 1566 ALBANY 2J 115 1 | 135 | 85.0 | 92.3 | 1519 ALBANY 7J 115 1567 ALBANY 7 115 1 | 17 | -- |
| SBA | 4179 DC SHORT 115 4191 MAYTOWN 115 1 | 128 | 88.1 | 92.3 | 4153 GORGAS#1 115 5707 EP SHORT 115 1 | 8 | -- |
| SBA | 915 PINSON 115 1754 METAL CON 115 1 | 135 | 79.3 | 92.2 | 181 ROCKY MTN 230 182 HAMMOND 230 1 | 12 | -- |
| SBA | 4154 GORGAS#4 115 4179 DC SHORT 115 1 | 128 | 88.0 | 92.2 | 4153 GORGAS#1 115 5707 EP SHORT 115 1 | 8 | -- |
| SBA | 4700 BARRY 6 230 7057 ECUA 230 1 | 602 | 91.7 | 91.8 | 4638 CHICK 6 230 4700 BARRY 6 230 1 | 5 | -- |
| SBA | 170 S GRIFFIN 230 746 S GRIFFIN 115 1 | 298 | 90.9 | 91.7 | 736 OHARA 115 739 BONANZA 115 1 | 2 | -- |
| SBA | 1055 BARNEYVILLE 115 1883 ADEL 1J 115 1 | 142 | 90.5 | 91.2 | 220 PINE GROVE 230 222 N TIFTON 230 1 | 19 | -- |
| SBA | 4924 MTVMILTP 115 5116 TUSK TAP 115 1 | 138 | 90.2 | 90.9 | 3021 LONGLEAF 500 4600 FARLEY 8 500 1 | 3 | -- |
| SBA | 164 UNION SCHL 230 224 OFFERMAN 230 1 | 509 | 90.4 | 90.8 | 15 THALMANN 500 2380 THAL LS1 230 1 | 19 | -- |
| SBA | 50 BULL SLUICE 230 52 N SPRINGS 230 1 | 539 | 88.3 | 90.7 | 3 NORCROSS 500 4 BULL SLUICE 500 1 | 21 | -- |
| SBA | 4234 CLAY 6 230 5039 ARGO DS 230 1 | 602 | 76.7 | 90.3 | 4156 MILLER6 230 4157 MILLER8 500 1 | 8 | -- |
| SBA | 1729 W V RICA 115 2486 HICKORY LVL 115 1 | 124 | 85.0 | 90.3 | 184 BREMEN 230 969 BREMEN 115 1 | 7 | -- |
| SBA | 8705 MSPT EFR 230 8710 MOSSPT E 230 1 | 866 | 87.7 | 90.3 | 4642 BIG CK 6 230 8702 DANIEL 230 1 | 1 | -- |

Scenario Explanations:

1) Barry Unit #5 Offline, Summer Peak Case
2) Branch Unit #4 Offline, Summer Peak Case
3) Bowen Unit #4 Offline, Summer Peak Case
4) Bowen Unit #4 Offline, Shoulder (93% Load Level) Case
5) Crist Unit #7 Offline, Summer Peak Case
6) Farley Unit #2 Offline, Shoulder (93% Load Level) Case
7) Greene County Unit #2 Offline, Shoulder (93% Load Level) Case
8) Gaston Unit #5 Offline, Summer Peak Case
9) Gaston Unit #5 Offline, Shoulder (93% Load Level) Case
10) Hatch Unit #1 Offline, Summer Peak Case
11) Hatch Unit #2 Offline, Summer Peak Case
12) Hammond Unit #4 Offline, Summer Peak Case
13) Kemper Unit Offline, Summer Peak Case
14) Kemper Unit Offline, Shoulder (93% Load Level) Case
15) Kraft Unit #3 Offline, Summer Peak Case
16) McDonough Unit #5 Offline, Summer Peak Case
17) McDonough Unit #5 Offline, Shoulder (93% Load Level) Case
18) Scholz Unit #2 Offline, Shoulder (93% Load Level) Case
19) Smith Unit #3 Offline, Summer Peak Case
20) Vogtle Unit #1 Offline, Summer Peak Case
21) Vogtle Unit #2 Offline, Summer Peak Case
22) Watson Unit #5 Offline, Summer Peak Case

## TVA Border to the SBA: Transfer Flows within the SERTP

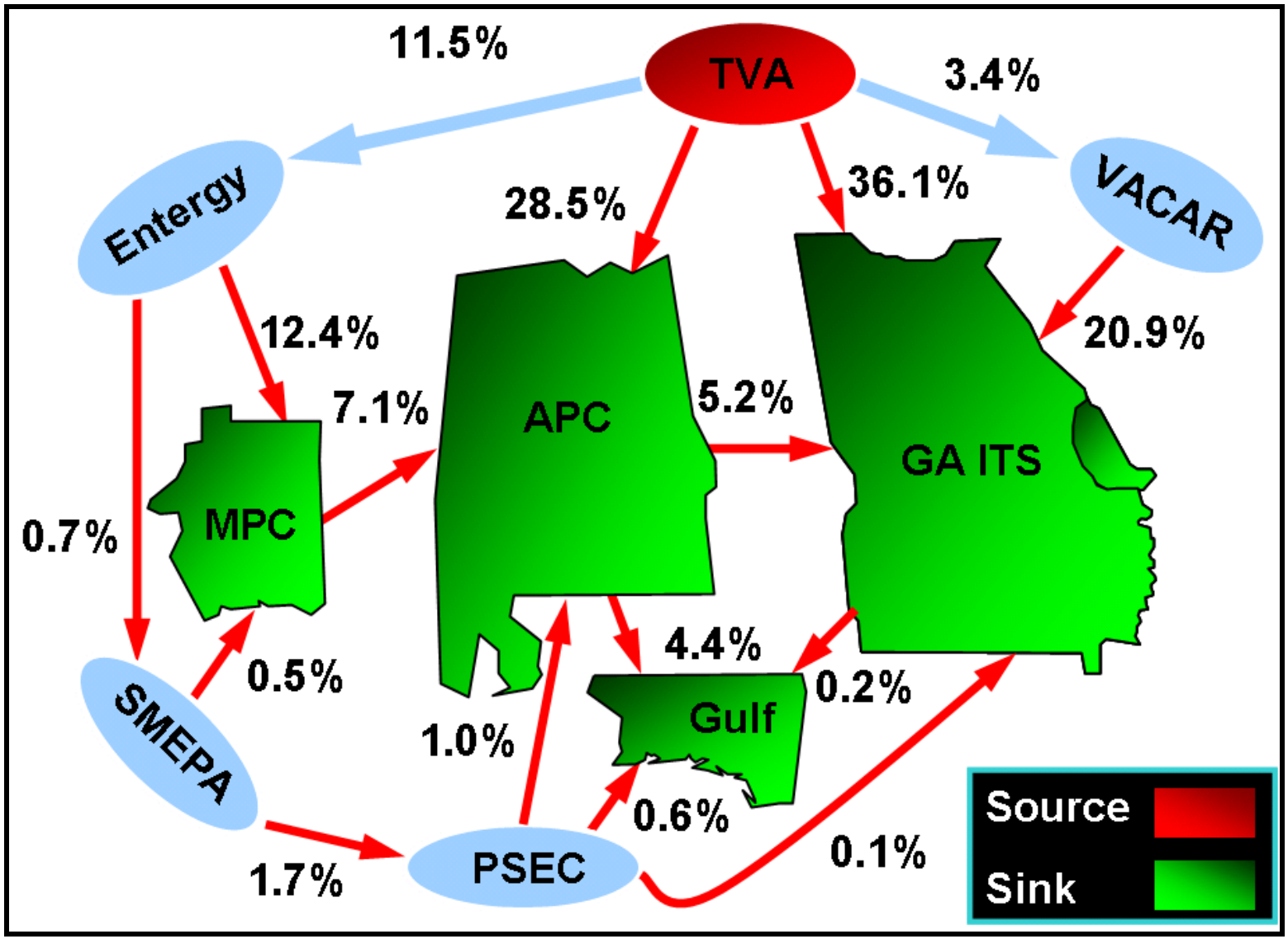


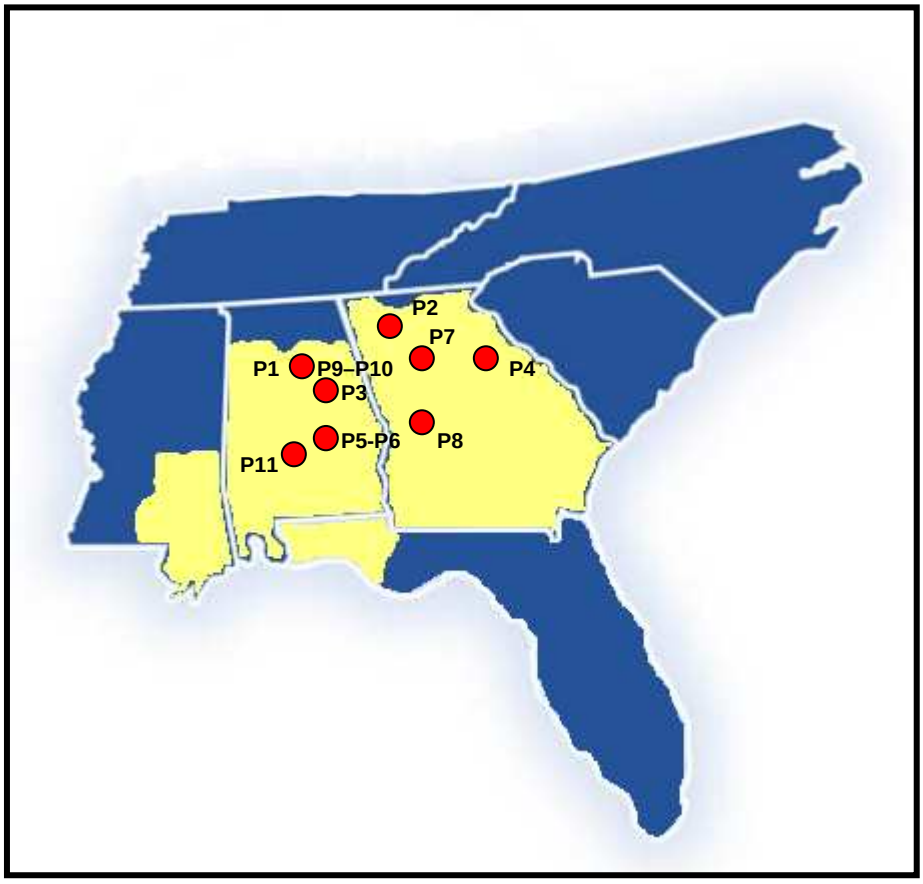
**Table 2.4. Potential Solutions for Identified Constraints – *Southern Balancing Authority***
The following projects are potential solutions to address the identified constraints and are based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur, and would impact the results of this study. In addition, the current projected enhancements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission system expansion plans could also impact the results of this study. These potential solutions only address constraints identified within the Southern Balancing Area that are associated with the proposed transfer. Other Balancing Areas were not monitored which could result in additional limitations and required system improvements.

| Item | Potential Solution | Estimated Need Date | Estimated Cost |
|---|---|---|---|
| **P1** | • Reconductor approximately 0.05 miles of the 19.6 mile 161 kV transmission line with 1351 ACSR at 100°C from Attalla to Albertville.<br>• Replace the two (2) 161 / 115 kV Autobanks at Attalla substation with two (2) 200 MVA Autobanks. | 2016 | $6,600,000[(1)] |
| **P2** | • Upgrade approximately 3.3 miles of 477 ACSR at 50°C to 75°C operation from Celanese to Calhoun Road | 2016 | $765,000 |
| **P3** | • Upgrade approximately 17.12 miles of 397 ACSR at 75°C to 100°C operation from Friendship to Lineville. | 2016 | $3,971,000 |
| **P4** | • Construct approximately 36 miles of new 2-1033 bundled ASCR 230 kV transmission line at 100° C from Hartwell Dam to Athena. | 2016 | $46,762,000[(1)] |
| **P5** | • Construct approximately 60 miles of new 1351 ACSR 230 kV transmission line at 100°C from Hillabee to LaGrange. | 2016 | $51,766,000 |
| **P6** | • Upgrade approximately 1.1 miles of 397 ACSR at 75°C to 100°C operation from Sunny Level Tap to Kellyton | 2016 | $255,000 |
| **P7** | • Replace the existing 1200 A line trap at Woodstock substation with a 1600 A line trap on the Ragsdale 230 kV transmission line. | 2016 | $200,000 |
| **P8** | • Reconductor approximately 8.5 miles of 795 ACSR at 100°C with 1351 ACSR at 100°C from Sonat Ell Junction to Talbot County | 2016 | $5,422,000 |
| **P9** | • Reconductor approximately 2.5 miles of 397 ACSR at 75°C with 795 ACSR at 100°C from Attalla to Gulf States Steel. | 2016 | $1,015,000 |
| **P10** | • Reconductor approximately 5.44 miles of 397 ACSR at 75°C with 795 ACSR at 100°C from Gulf States Steel to Rainbow City. | 2016 | $2,208,000 |
| **P11** | • Upgrade approximately 25.9 miles of 1033 ACSR at 75°C to 100°C operation from North Selma to Autaugaville. | 2016 | $6,847,000 |
| TOTAL ($2016) | | | $125,811,000 |

[(1)] This transmission solution was proposed to alleviate the loading of a tie-line constraint between the SBA and a non-participating Transmission Owner. Therefore, the cost associated with the transmission

solution is only for the portion of solution that is located within the participating Transmission Owners' territory. This solution effectively alleviates the identified constraint(s), however, the impacts to adjacent transmission systems that are external to the participating Transmission Owners were not evaluated. These impacts, as well as coordinated transmission solutions to alleviate any identified constraints, can be determined if this transfer is brought forth to be evaluated in the Southeast Inter-Regional Participation Process ("SIRPP").

**Diagram 2.1. Approximate Location of Potential Solutions**



## Interchange Assumptions

**Table 2.5. Transactions Modeled in Starting Point Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *735231* | *SOCO* | *Duke* | *50* |
| *735232* | *SOCO* | *Duke* | *25* |
| *823644* | *SOCO* | *Duke* | *90* |
| *823646* | *SOCO* | *Duke* | *90* |
| *787707* | *SOCO* | *TVA* | *73* |
| *672440* | *TVA* | *SOCO* | *208* |
| *77603* | *SOCO* | *PSEC* | *114* |
| *765080* | *PSEC* | *SOCO* | *1092* |
| -- | *SOCO* | *PSEC* | *5* |
| -- | *MEAG* | *PSEC* | *62* |
| -- | *GTC* | *PSEC* | *30* |
| -- | *SOCO* | *PSEC* | *267* |
| -- | *SEPA* | *SOCO* | *681* |
| -- | *SBA* | *FRCC* | *2435 / 3700*[(1)] |

[(1)]Southern performed studies with both 2435 MW and 3700 MW of interchange between Florida and the SBA

**Table 2.6. Additional Transactions Modeled in Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *869848* | *EES* | *SOCO* | *150* |
| *814051* | *EES* | *SOCO* | *50* |
| *854479* | *EES* | *SOCO* | *196* |
| *705288* | *EES* | *Duke* | *50* |
| *705289* | *EES* | *Duke* | *100* |
| *869847* | *Duke* | *SOCO* | *50* |
| *147617* | *SC* | *GTC* | *296* |
| *147616* | *SCEG* | *GTC* | *285* |
| *147615* | *Duke* | *GTC* | *465* |
| *147613* | *TVA* | *GTC* | *310* |
| *72133712* | *Duke* | *MEAG* | *50* |

**Table 2.7. Capacity Benefit Margin Modeled (CBM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *Duke* | *310* |
| *Southern* | *TVA* | *400* |
| *Southern* | *EES* | *100* |
| *Southern* | *SCPSA* | *120* |
| *Southern* | *SCEG* | *120* |
| *GTC* | *TVA* | *221* |
| *GTC* | *Duke* | *104* |
| *GTC* | *SCEG* | *47* |
| *GTC* | *SCPSA* | *28* |

For more information on Southern's CBM, click here.
For more information on GTC's CBM, click here.

**Table 2.8. Transmission Reliability Margins Modeled (TRM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *From Duke* | *199.46* |
| *GTC* | *From Duke* | *100.65* |
| *MEAG* | *From Duke* | *26.26* |
| *Dalton* | *From Duke* | *3.53* |
| *Southern* | *From Entergy* | *205.01* |
| *Southern* | *From TVA* | *233.43* |
| *GTC* | *From TVA* | *48.57* |
| *MEAG* | *From TVA* | *12.67* |
| *Dalton* | *From TVA* | *1.70* |

For more information on the Southern Balancing Authority's TRM, click here.

# *SCPSA Border to the Southern Balancing Authority ("SBA")*

# *200 MW*

## Study Structure and Assumptions

| Transfer Sensitivity | Transfer Amount | Transfer Source | Transfer Sink | Study Year |
|---|---|---|---|---|
| SCPSA Border to SBA | 200 MW | SCPSA | SBA | 2016 |
| **Load Flow Cases** | | | | |
| 2010 Series Version 2C Cases: Summer Peak and Shoulder (93% load level) | | | | |
| **Source Modeled** | | | | |
| The source for this transfer was a uniform load reduction in SCPSA | | | | |

### Transmission System Impacts

**Table 3.1. Pass 0 – Transmission System Impacts With All Proposed Enhancements – *Southern Balancing Authority***

The following table identifies constraints in the Southern Balancing Authority ("SBA") with all proposed enhancements applied to the transmission system. The resulting facilities in the table below could become potential constraints in future years or with different queuing assumptions, but are not overloaded in the 2016 study year.

| | | | Thermal Loadings (%) | | | | |
|---|---|---|---|---|---|---|---|
| AREA | Limiting Element | Rating (MVA) | Without Request | With Request | Contingency | Scenario | Project |
| **The following facilities could become potential constraints in future years or with different queuing assumptions** | | | | | | | |
| SBA | 165 W BRUNSWICK 230 2592 THALMANN 2 230 1 | 509 | 99.6 | 99.7 | 2380 THAL LS1 230 2591 THALMANN 1 230 1 | 12 | -- |
| SBA | 5003 GRANTMIL 115 5191 MTSITETP 115 1 | 138 | 98.6 | 99.5 | 4156 MILLER6 230 4157 MILLER8 500 1 | 17 | -- |
| SBA | 17290 BAYSP J 115 17295 SLOC JCT 115 1 | 142 | 99.1 | 99.2 | 4601 FARLEY 6 230 5518 COTONWD6 230 1 | 18 | -- |
| SBA | 17221 LIBERTY6 230 17222 LIBERTY3 115 1 | 168 | 98.5 | 98.6 | 17221 LIBERTY6 230 17222 LIBERTY3 115 2 | 18 | -- |
| SBA | 4400 GASTON 230 4996 POWERSYS 230 1 | 497 | 97.8 | 98.6 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 15 | -- |
| SBA | 4443 THURLOW 115 4445 YATESDAM 115 1 | 117 | 98.3 | 98.5 | 4534 AUB MONT 115 5136 MADPARK3 115 1 | 6 | -- |
| SBA | 2522 SONAT ELL J 230 3020 TALBOT CO 1 230 1 | 433 | 97.7 | 98.4 | 13 BONAIRE 500 2345 SMARR 500 1 | 13 | -- |
| SBA | 130 GOAT ROCK 230 1530 CAMP MCKENZ 230 1 | 1204 | 97.7 | 97.9 | 125 FORTSON 230 130 GOAT ROCK 230 1 | 13 | -- |
| SBA | 4740 GKN W LD 115 5257 HALACLTP 115 1 | 107 | 97.6 | 97.9 | 4514 S MONTG3 115 4547 PINEDALE 115 1 | 6 | -- |
| SBA | 434 LAWRENCEVL 115 1363 LAWRNCEVL 3 115 1 | 188 | 97.4 | 97.6 | 1937 BAY CREEK 115 2070 LAWVL 4J 115 1 | 16 | -- |
| SBA | 916 CALHOUN RD 115 917 CELANESE 115 1 | 79 | 93.9 | 97.6 | 181 ROCKY MTN 230 182 HAMMOND 230 1 | 14 | -- |
| SBA | 125 FORTSON 230 1530 CAMP MCKENZ 230 1 | 1192 | 97 | 97.2 | 125 FORTSON 230 130 GOAT ROCK 230 1 | 12 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) | | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| | | | Without Request | With Request | | | |
| SBA | 4200 BESSEMER 115 5060 GREENWD 115 1 | 216 | 96.8 | 97.1 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 9 | -- |
| SBA | 4996 POWERSYS 230 5058 FAYETVIL 230 1 | 502 | 96.3 | 97.1 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 15 | -- |
| SBA | 104 LEXINGTON 230 339100 6RUSSEL 230 1 | 596 | 94.5 | 96.9 | 11 S HALL 500 306105 8OCONEE 500 1 | 16 | -- |
| SBA | 4488 N SELMA3 115 4489 N SELMA6 230 1 | 302 | 96.4 | 96.5 | 4488 N SELMA3 115 4489 N SELMA6 230 2 | 2 | -- |
| SBA | 5060 GREENWD 115 5203 AIRPT LN 115 1 | 216 | 96 | 96.3 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 9 | -- |
| SBA | 17079 OPINE RD 115 17147 OPP SW 3 115 1 | 157 | 96 | 96.1 | 17010 COFFEE SP JC115 17222 LIBERTY3 115 1 | 18 | -- |
| SBA | 24 N TIFTON 500 222 N TIFTON 230 1 | 1536 | 95.7 | 96 | 2500 RACCOON CK 500 2510 RACCOON CK 230 1 | 18 | -- |
| SBA | 17407 GRDNVL J 115 17437 TRICKEM 115 1 | 134 | 95.5 | 95.8 | 4512 SNOWDN8 500 4600 FARLEY 8 500 1 | 6 | -- |
| SBA | 1811 BUSHNELL 115 2517 LAKE BEA 115 1 | 63 | 95.1 | 95.8 | 223 DOUGLAS 230 2516 STUMP CRK 230 1 | 12 | -- |
| SBA | 693 SAWHATCHEE 115 1569 BLAKELY 1 115 1 | 135 | 95.6 | 95.7 | 692 BLAKELY 2 115 1890 YELLOWPINEJ 115 1 | 18 | -- |
| SBA | 681 MITCHELL 115 682 LESTER 115 1 | 124 | 95.4 | 95.5 | 24 N TIFTON 500 222 N TIFTON 230 1 | 18 | -- |
| SBA | 5058 FAYETVIL 230 5897 CO LINE6 230 1 | 502 | 94.7 | 95.5 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 15 | -- |
| SBA | 4598 PINCK 6 230 5138 PIKE CO6 230 1 | 478 | 94.4 | 94.8 | 4512 SNOWDN8 500 4600 FARLEY 8 500 1 | 6 | -- |
| SBA | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 2598 | 93.9 | 94.7 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | -- |
| SBA | 4499 RF HENRY 115 17437 TRICKEM 115 1 | 142 | 94.3 | 94.5 | 4512 SNOWDN8 500 4600 FARLEY 8 500 1 | 6 | -- |
| SBA | 4508 MONTG SS 230 5897 CO LINE6 230 1 | 502 | 94.0 | 94.3 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 8 | -- |
| SBA | 2035 S HALL 230 3067 CANDLER 230 1 | 509 | 92.4 | 94.3 | 3 NORCROSS 500 11 S HALL 500 1 | 16 | -- |
| SBA | 612 FIRST AVE + 115 616 BLNCHARD IP 115 1 | 199 | 93.7 | 93.8 | 612 FIRST AVE + 115 1561 RIVERFRONTJ 115 1 | 8 | -- |
| SBA | 1109 SPRING CRK 115 1822 PINEHILL J1 115 1 | 79 | 93.5 | 93.7 | 1109 SPRING CRK 115 2527 FLOYDTOWN 115 1 | 18 | -- |
| SBA | 131 FIRST AVE A 230 612 FIRST AVE + 115 1 | 298 | 93.5 | 93.6 | 132 FIRST AVE B 230 612 FIRST AVE + 115 1 | 7 | -- |
| SBA | 1035 E BAINBRDGE 115 2515 PROPEX J 115 1 | 79 | 93.3 | 93.4 | 1109 SPRING CRK 115 2527 FLOYDTOWN 115 1 | 18 | -- |
| SBA | 1822 PINEHILL J1 115 2515 PROPEX J 115 1 | 79 | 93.3 | 93.4 | 1109 SPRING CRK 115 2527 FLOYDTOWN 115 1 | 18 | -- |
| SBA | 848 PINEGROVE 115 1464 HAZLE J 115 1 | 114 | 93.0 | 93.4 | 843 VIDALIA 115 1476 W LYONS J2 115 1 | 19 | -- |
| SBA | 615 VICTORY DR 115 616 BLNCHARD IP 115 1 | 199 | 93.1 | 93.2 | 612 FIRST AVE + 115 1561 RIVERFRONTJ 115 1 | 6 | -- |
| SBA | 4361 MCADORTP 115 5706 BNTBRKTP 115 1 | 138 | 92.6 | 93.2 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 9 | -- |
| SBA | 4233 CLAY 3 115 4234 CLAY 6 230 1 | 398 | 92.9 | 93 | 4234 CLAY 6 230 5039 ARGO DS 230 1 | 11 | -- |
| SBA | 911 ARMUCHEE J 115 914 GALEY&LORD+ 115 1 | 96 | 92.4 | 92.9 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 14 | -- |
| SBA | 914 GALEY&LORD+ 115 915 PINSON 115 1 | 96 | 92.4 | 92.8 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 14 | -- |
| SBA | 104 LEXINGTON 230 133 R_E WATKNVL 230 1 | 602 | 90.5 | 92.8 | 11 S HALL 500 306105 8OCONEE 500 1 | 16 | -- |
| SBA | 4640 SILVER 6 230 4641 SILVER 3 115 1 | 336 | 92.6 | 92.7 | 4640 SILVER 6 230 4641 SILVER 3 115 2 | 5 | -- |
| SBA | 94 BIO 230 105 VANNA 230 1 | 433 | 90.2 | 92.6 | 11 S HALL 500 306105 8OCONEE 500 1 | 16 | -- |
| SBA | 160 HATCH + 230 164 UNION SCHL 230 1 | 509 | 92.3 | 92.5 | 15 THALMANN 500 2380 THAL LS1 230 1 | 6 | -- |
| SBA | 4508 MONTG SS 230 4513 S MONTG6 230 1 | 807 | 92.3 | 92.5 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 8 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 17221 LIBERTY6 230 17222 LIBERTY3 115 2 | 168 | 92.0 | 92.1 | 17221 LIBERTY6 230 17222 LIBERTY3 115 1 | 18 | -- |
| SBA | 3 NORCROSS 500 65 NORCROSS 230 2 | 2016 | 91.8 | 92.1 | 3 NORCROSS 500 65 NORCROSS 230 1 | 16 | -- |
| SBA | 571 SYLVANIA 115 581 KING MFG + 115 1 | 63 | 91.2 | 91.9 | 8 VOGTLE 500 9 W MCINTOSH 500 1 | 12 | -- |
| SBA | 4489 N SELMA6 230 5500 AUTAUG6 230 1 | 404 | 88.7 | 91.9 | 8008 KEMPER 230 8009 KEMPER1 230 1 | 9 | -- |
| SBA | 1096 LOWNDES 115 1886 W VALDOSTA 115 1 | 187 | 91.4 | 91.5 | 220 PINE GROVE 230 1885 W VALDOSTA 230 1 | 13 | -- |
| SBA | 130 GOAT ROCK 230 3023 FRANKLIN 1 230 1 | 1244 | 91.2 | 91.3 | Base Case | 12 | -- |
| SBA | 17077 PERYSTRJ 115 17079 OPINE RD 115 1 | 157 | 91.2 | 91.3 | 17010 COFFEE SP JC115 17222 LIBERTY3 115 1 | 18 | -- |
| SBA | 4655 N MOBILE 115 4674 KUSHLA 115 1 | 212 | 91.0 | 91.2 | 4112 LYNNDELL TP 115 4840 COTHILLS 115 1 | 4 | -- |
| SBA | 8702 DANIEL 230 8705 MSPT EFR 230 1 | 866 | 91.0 | 91.2 | 4642 BIG CK 6 230 8702 DANIEL 230 1 | 1 | -- |
| SBA | 4549 MERRY TP 115 17987 CECIL TP 115 1 | 112 | 90.7 | 91.1 | 4512 SNOWDN8 500 4600 FARLEY 8 500 1 | 6 | -- |
| SBA | 4521 PRTMNTTP 115 4942 E.PRATVL 115 1 | 216 | 90.3 | 90.4 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 8 | -- |
| SBA | 164 UNION SCHL 230 224 OFFERMAN 230 1 | 509 | 90.1 | 90.3 | 15 THALMANN 500 2380 THAL LS1 230 1 | 6 | -- |
| SBA | 4528 N MONTGY 115 4529 FORBESRD 115 1 | 210 | 89.9 | 90.1 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 8 | -- |

**Scenario Explanations:**

1) Barry Unit #5 Offline, Summer Peak Case
2) Barry Unit #5 Offline, Shoulder (93% Load Level) Case
3) Bowen Unit #4 Offline, Summer Peak Case
4) Crist Unit #7 Offline, Summer Peak Case
5) Daniel CC Unit #Offline, Summer Peak Case
6) Farley Unit #1 Offline, Summer Peak Case
7) Farley Unit #1 Offline, Shoulder (93% Load Level) Case
8) Farley Unit #2 Offline, Summer Peak Case
9) Greene Co. Unit #2 Offline, Shoulder (93% Load Level) Case
10) Gadsden Unit #2 Offline, Summer Peak Case
11) Gaston Unit #5 Offline, Summer Peak Case
12) Hatch Unit #1 Offline, Summer Peak Case
13) Hatch Unit #2 Offline, Summer Peak Case
14) Hammond Unit #4 Offline, Summer Peak Case
15) Harris Unit #1 Offline, Summer Peak Case
16) McDonough Unit #5 Offline, Summer Peak Case
17) Miller Unit #1 Offline, Summer Peak Case
18) Smith Unit #3 Offline, Summer Peak Case
19) Vogtle Unit #2 Offline, Summer Peak Case

## SCPSA Border to the SBA: Transfer Flows within the SERTP

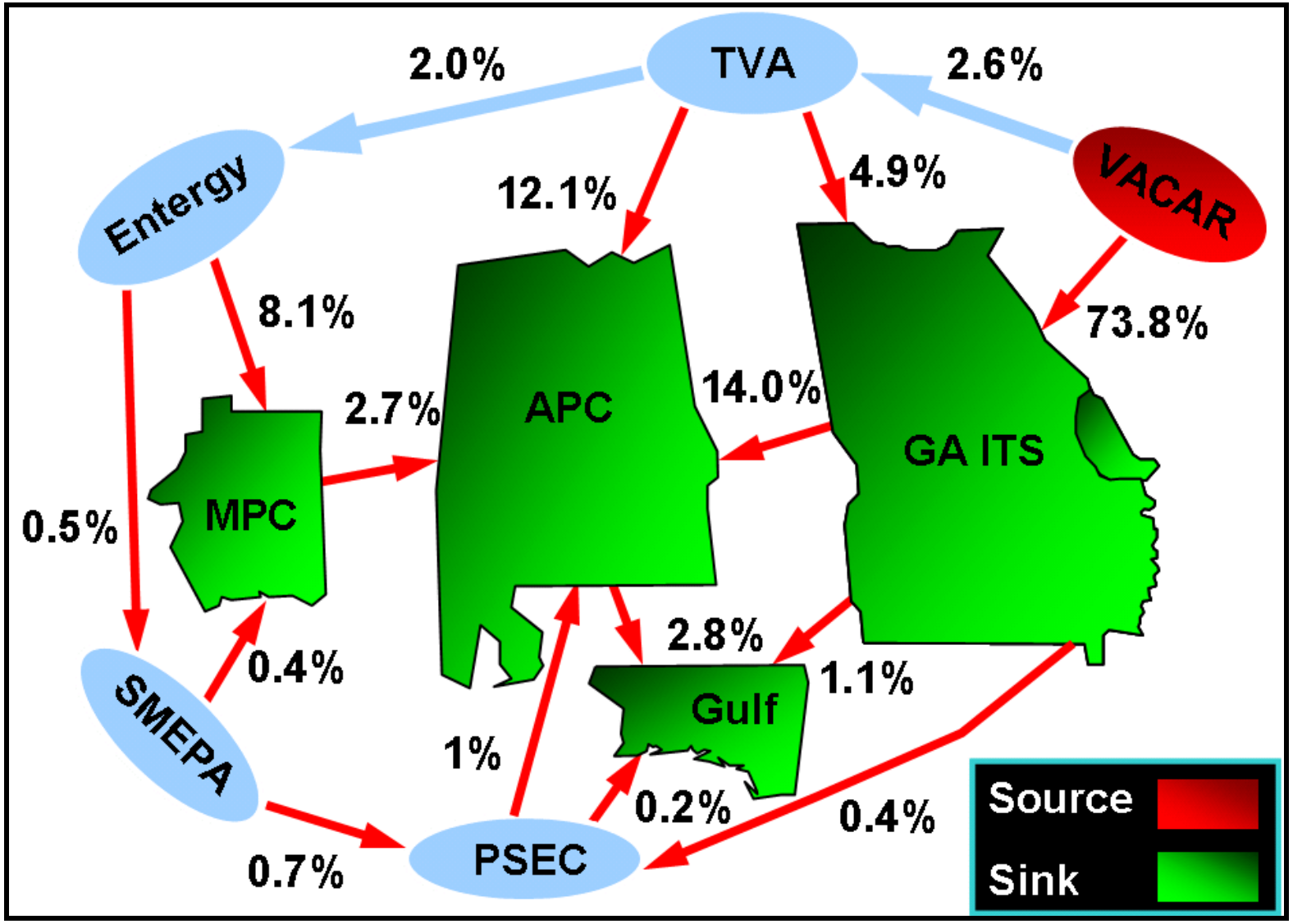
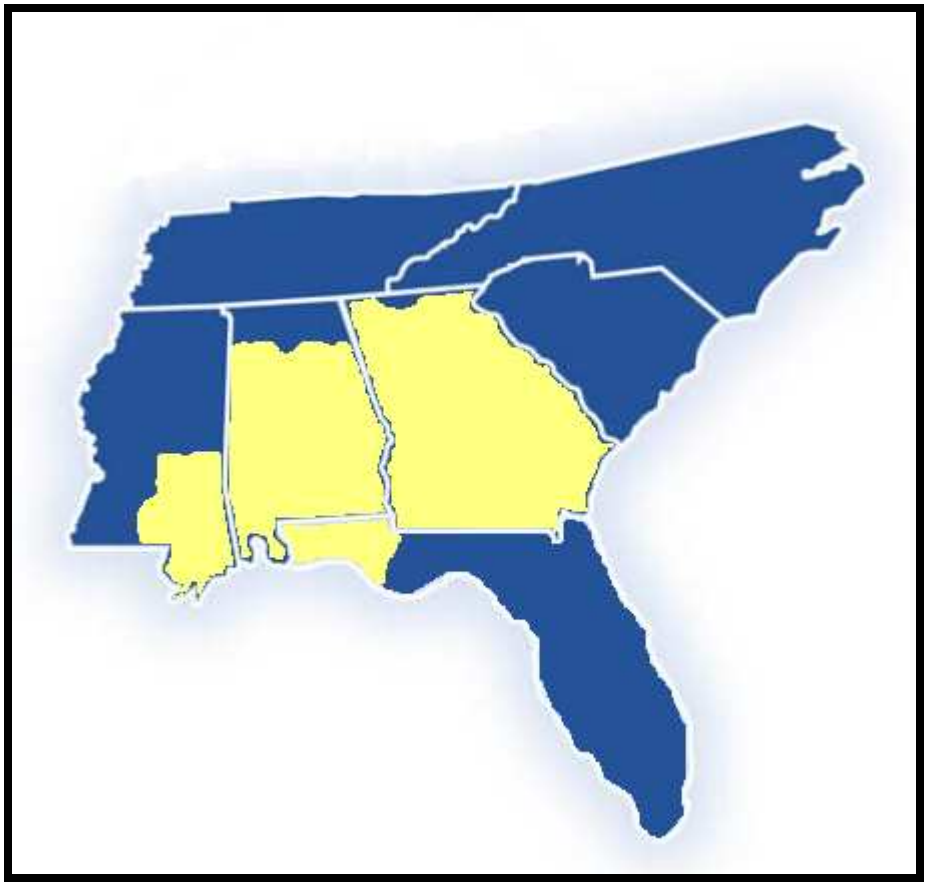


**Table 3.2. Potential Solutions for Identified Constraints – *Southern Balancing Authority***
The following projects are potential solutions to address the identified constraints and are based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur, and would impact the results of this study. In addition, the current projected enhancements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission system expansion plans could also impact the results of this study. These potential solutions only address constraints identified within the Southern Balancing Area that are associated with the proposed transfer. Other Balancing Areas were not monitored which could result in additional limitations and required system improvements.

| Item | Potential Solution | Estimated Need Date | Estimated Cost |
|---|---|---|---|
| **N/A** | -- | -- | -- |
| **TOTAL (2016$)** | | | $0 |

**Diagram 3.1. Approximate Location of Potential Solutions**



## Interchange Assumptions

**Table 3.3. Transactions Modeled in Starting Point Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *735231* | *SOCO* | *Duke* | *50* |
| *735232* | *SOCO* | *Duke* | *25* |
| *823644* | *SOCO* | *Duke* | *90* |
| *823646* | *SOCO* | *Duke* | *90* |
| *787707* | *SOCO* | *TVA* | *73* |
| *672440* | *TVA* | *SOCO* | *208* |
| *77603* | *SOCO* | *PSEC* | *114* |
| *765080* | *PSEC* | *SOCO* | *1092* |
| -- | *SOCO* | *PSEC* | *5* |
| -- | *MEAG* | *PSEC* | *62* |
| -- | *GTC* | *PSEC* | *30* |
| -- | *SOCO* | *PSEC* | *267* |
| -- | *SEPA* | *SOCO* | *681* |
| -- | *SBA* | *FRCC* | *2435 / 3700*[(1)] |

[(1)]Southern performed studies with both 2435 MW and 3700 MW of interchange between Florida and the SBA

**Table 3.4. Additional Transactions Modeled in Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *869848* | *EES* | *SOCO* | *150* |
| *814051* | *EES* | *SOCO* | *50* |
| *854479* | *EES* | *SOCO* | *196* |
| *705288* | *EES* | *Duke* | *50* |
| *705289* | *EES* | *Duke* | *100* |
| *869847* | *Duke* | *SOCO* | *50* |
| *147617* | *SC* | *GTC* | *296* |
| *147616* | *SCEG* | *GTC* | *285* |
| *147615* | *Duke* | *GTC* | *465* |
| *147613* | *TVA* | *GTC* | *310* |
| *72133712* | *Duke* | *MEAG* | *50* |

**Table 3.5. Capacity Benefit Margin Modeled (CBM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *Duke* | *310* |
| *Southern* | *TVA* | *400* |
| *Southern* | *EES* | *100* |
| *Southern* | *SCPSA* | *120* |
| *Southern* | *SCEG* | *120* |
| *GTC* | *TVA* | *221* |
| *GTC* | *Duke* | *104* |
| *GTC* | *SCEG* | *47* |
| *GTC* | *SCPSA* | *28* |

For more information on Southern's CBM, click here.
For more information on GTC's CBM, click here.

**Table 3.6. Transmission Reliability Margins Modeled (TRM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *From Duke* | *199.46* |
| *GTC* | *From Duke* | *100.65* |
| *MEAG* | *From Duke* | *26.26* |
| *Dalton* | *From Duke* | *3.53* |
| *Southern* | *From Entergy* | *205.01* |
| *Southern* | *From TVA* | *233.43* |
| *GTC* | *From TVA* | *48.57* |
| *MEAG* | *From TVA* | *12.67* |
| *Dalton* | *From TVA* | *1.70* |

For more information on the Southern Balancing Authority's TRM, click here.

# *Duke Border to the Southern Balancing Authority ("SBA")*

# *2000 MW*

## Study Structure and Assumptions

| Transfer Sensitivity | Transfer Amount | Transfer Source | Transfer Sink | Study Year |
|---|---|---|---|---|
| Duke Border to SBA | 2000 MW | Duke | SBA | 2016 |
| **Load Flow Cases** | | | | |
| 2010 Series Version 2C Cases: Summer Peak and Shoulder (93% load level) | | | | |
| **Source Modeled** | | | | |
| The source for this transfer was a uniform load reduction in Duke | | | | |

### Transmission System Impacts

Tables 4.1 through 4.3 below identify thermal constraints attributable to the requested transfer for the contingency and scenario that resulted in the highest facility loading for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

**Table 4.1. Pass 0 – Transmission System Impacts With No Enhancements – *Southern Balancing Authority***

The following table identifies significant constraints in the Southern Balancing Authority ("SBA") without any enhancements to the transmission system. The 2000 MW transfer from Duke Border to the SBA results in overloads of several 115 kV, 230 kV and 500 kV facilities. Projects were first identified to alleviate these constraints before alleviating the remaining constraints because the proposed enhancements significantly alter load flow in the SBA.

| | | | Thermal Loadings (%) | | | | |
|---|---|---|---|---|---|---|---|
| AREA | Limiting Element | Rating (MVA) | Without Request | With Request | Contingency | Scenario | Project |
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 104 LEXINGTON 230 339100 6RUSSEL 230 1 | 596 | 94.5 | 125.6 | 11 S HALL 500 306105 8OCONEE 500 1 | 17 | P1 |
| SBA | 104 LEXINGTON 230 133 R_E WATKNVL 230 1 | 602 | 90.3 | 121.0 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | P1 |
| SBA | 94 BIO 230 105 VANNA 230 1 | 433 | 92.9 | 117.2 | 11 S HALL 500 306105 8OCONEE 500 1 | 17 | P1 |
| SBA | 11 S HALL 500 306105 8OCONEE 500 1 | 2598 | 84.2 | 112.6 | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 3 | N/A[1] |
| SBA | 102 E WATKNSV 1 230 133 R_E WATKNVL 230 1 | 662 | 82.0 | 109.9 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | P1 |
| SBA | 94 BIO 230 3000 HW ENERGY 230 1 | 828 | 88.6 | 108.4 | 11 S HALL 500 306105 8OCONEE 500 1 | 17 | P1 |
| SBA | 102 E WATKNSV 1 230 492 E WATKINSVL 115 1 | 332 | 86.6 | 107.9 | 102 E WATKNSV 1 230 122 E WATKNSV 2 230 1 | 17 | P1 |
| SBA | 87 R_VANNA 230 99 NEW HAVEN 230 1 | 433 | 80.3 | 107.1 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | P1 |

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 2598 | 92.6 | 106.7 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | N/A[2] |
| SBA | 472 AIRLINE 1 115 2003 AIRLINE 2 115 1 | 269 | 87.6 | 104.9 | 94 BIO 230 105 VANNA 230 1 | 17 | P1 |
| SBA | 93 CENTER PR 230 99 NEW HAVEN 230 1 | 433 | 79.8 | 104.3 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | P1 |
| SBA | 11 S HALL 500 2035 S HALL 230 1 | 2016 | 76.9 | 102.5 | 3 NORCROSS 500 11 S HALL 500 1 | 7 | P1 |

(1) The limiting element of this 500 kV tie-line constraint is located within DUKE.
(2) The limiting element of this 500 kV tie-line constraint is located within TVA.

**Table 4.2. Pass 1 – Transmission System Impacts With Proposed Enhancement "P1"– *Southern Balancing Authority***

The following table identifies significant constraints in the Southern Balancing Authority ("SBA") with the proposed enhancement "P1" applied to the transmission system. Before additional enhancements were determined for remaining constraints, only enhancements that could significantly change load flow in surrounding areas were identified in the table below.

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 2035 S HALL 230 3067 CANDLER 230 1 | 509 | 91.2 | 128.4 | 3 NORCROSS 500 11 S HALL 500 1 | 18 | P5 |
| SBA | 4332 ATTALLA5 161 360283 5ALBERTVILLE161 1 | 193 | 73.4 | 125.7 | 4234 CLAY 6 230 4247 ONEONTA6 230 1 | 5 | P6 |
| SBA | 93 CENTER PR 230 1311 ATHENA 230 1 | 596 | 19.8 | 125.4 | 11 S HALL 500 306105 8OCONEE 500 1 | 17 | P2 |
| SBA | 3067 CANDLER 230 3073 BRASELTON 230 1 | 509 | 84.4 | 121.6 | 3 NORCROSS 500 11 S HALL 500 1 | 18 | P5 |
| SBA | 4331 ATTALLA3 115 4332 ATTALLA5 161 1 | 99 | 63.1 | 119.4 | 4331 ATTALLA3 115 4332 ATTALLA5 161 2 | 6 | P6 |
| SBA | 4331 ATTALLA3 115 4332 ATTALLA5 161 2 | 111 | 75.5 | 114.9 | 4234 CLAY 6 230 4247 ONEONTA6 230 1 | 6 | P6 |
| SBA | 95 WINDER PR 230 2021 CLARKSBORO 230 1 | 433 | 69.5 | 107.2 | 11 S HALL 500 306105 8OCONEE 500 1 | 17 | P4 |
| SBA | 93 CENTER PR 230 2021 CLARKSBORO 230 1 | 373 | 46.2 | 103.5 | 11 S HALL 500 306105 8OCONEE 500 1 | 17 | P3 |
| SBA | 11 S HALL 500 306105 8OCONEE 500 1 | 2598 | 84.2 | 101.5 | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 3 | N/A[1] |

(1) The limiting element of this 500 kV tie-line constraint is located within DUKE.

**Table 4.3. Pass 2 – Transmission System Impacts With Proposed Enhancement "P1" through "P6" – *Southern Balancing Authority***

The following table identifies significant constraints in the Southern Balancing Authority ("SBA") with the proposed enhancement "P1" through "P6" applied to the transmission system. Before additional enhancements were determined for remaining constraints, only enhancements that could significantly change load flow in surrounding areas were identified in the table below.

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 4311 GS STEEL 115 5069 NRAINBOW 115 1 | 112 | 59.6 | 118.0 | 4323 EGADSDEN 115 4324 GADSDEN 115 1 | 13 | P10 |
| SBA | 916 CALHOUN RD 115 917 CELANESE 115 1 | 79 | 94.8 | 115.8 | 181 ROCKY MTN 230 182 HAMMOND 230 1 | 12 | P12 |
| SBA | 5069 NRAINBOW 115 5419 KEYSTONE TP 115 1 | 112 | 45.5 | 104.3 | 4323 EGADSDEN 115 4324 GADSDEN 115 1 | 13 | P10 |
| SBA | 434 LAWRENCEVL 115 1363 LAWRNCEVL 3 115 1 | 188 | 97.1 | 102.5 | 1937 BAY CREEK 115 2070 LAWVL 4J 115 1 | 17 | P11 |
| SBA | 4489 N SELMA6 230 5500 AUTAUG6 230 1 | 404 | 78.2 | 101.5 | 4374 S.BESS 6 230 4375 S.BESS 8 500 1 | 16 | P9 |
| SBA | 4996 POWERSYS 230 5058 FAYETVIL 230 1 | 502 | 96.3 | 101.4 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 14 | P8 |
| SBA | 165 W BRUNSWICK 230 2592 THALMANN 2 230 1 | 509 | 99.6 | 100.3 | 2380 THAL LS1 230 2591 THALMANN 1 230 1 | 9 | P7 |

**Table 4.4. Pass 3 – Transmission System Impacts With All Proposed Enhancements – *Southern Balancing Authority***

The following table identifies constraints in the Southern Balancing Authority ("SBA") with all proposed enhancements applied to the transmission system. The resulting facilities in the table below could become potential constraints in future years or with different queuing assumptions, but are not overloaded in the 2016 study year.

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| **The following facilities could become potential constraints in future years or with different queuing assumptions** | | | | | | | |
| SBA | 4310 RAINBOW 115 5419 KEYSTONE TP 115 1 | 112 | 39.7 | 99.5 | 4323 EGADSDEN 115 4324 GADSDEN 115 1 | 13 | -- |
| SBA | 4428 MITCHDAM 115 4733 CRH TAP 115 1 | 138 | 84.7 | 99.4 | 4489 N SELMA6 230 5500 AUTAUG6 230 1 | 15 | -- |
| SBA | 4311 GS STEEL 115 4331 ATTALLA3 115 1 | 138 | 49.2 | 99.3 | 21 MOSTELLER 500 2499 CONASAUGA 500 1 | 6 | -- |
| SBA | 4200 BESSEMER 115 5060 GREENWD 115 1 | 216 | 96.3 | 98.8 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 20 | -- |
| SBA | 804 BONAIRE 115 2263 WATERFORD 115 1 | 124 | 46.2 | 98.8 | 150 BONAIRE 230 1603 KATHLEEN 230 1 | 16 | -- |
| SBA | 2499 CONASAUGA 500 360662 8BRADLEY TN 500 1 | 2598 | 92.6 | 98.4 | 11 S HALL 500 306105 8OCONEE 500 1 | 3 | -- |
| SBA | 4504 CLANT TP 115 4733 CRH TAP 115 1 | 138 | 83.7 | 98.4 | 4489 N SELMA6 230 5500 AUTAUG6 230 1 | 15 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 4537 CARTHILL 115 4538 HOLT ST 115 1 | 135 | 96.8 | 98.0 | 4510 W MONTG3 115 4527 MAX AFB 115 1 | 4 | -- |
| SBA | 2522 SONAT ELL J 230 3020 TALBOT CO 1 230 1 | 433 | 97.7 | 98.0 | 13 BONAIRE 500 2345 SMARR 500 1 | 16 | -- |
| SBA | 5060 GREENWD 115 5203 AIRPT LN 115 1 | 216 | 95.6 | 98.0 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 11 | -- |
| SBA | 363 HOPEWELL 115 1714 BIRMINGHAM 115 1 | 188 | 97.1 | 97.2 | 956 HOLLY SP 115 1722 NEWLIGHT CH 115 1 | 2 | -- |
| SBA | 1882 N CAMILLA 230 2510 RACCOON CK 230 1 | 509 | 96.4 | 96.8 | 218 S BAINBRDGE 230 4601 FARLEY 6 230 1 | 8 | -- |
| SBA | 4189 PRATCTY3 115 4190 PRATCTY6 230 1 | 398 | 92.4 | 96.8 | 5144 ACIPCO6 230 5145 ACIPCO3 115 1 | 8 | -- |
| SBA | 4200 BESSEMER 115 4202 BESSGRCO 230 1 | 392 | 90.6 | 96.8 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 7 | -- |
| SBA | 571 SYLVANIA 115 581 KING MFG + 115 1 | 63 | 91.2 | 96.1 | 8 VOGTLE 500 9 W MCINTOSH 500 1 | 9 | -- |
| SBA | 4361 MCADORTP 115 5706 BNTBRKTP 115 1 | 138 | 92.0 | 95.8 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 16 | -- |
| SBA | 911 ARMUCHEE J 115 914 GALEY&LORD+ 115 1 | 96 | 92.4 | 95.7 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 12 | -- |
| SBA | 914 GALEY&LORD+ 115 915 PINSON 115 1 | 96 | 92.4 | 95.7 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 12 | -- |
| SBA | 11 S HALL 500 2035 S HALL 230 1 | 2016 | 76.8 | 95.6 | 3 NORCROSS 500 11 S HALL 500 1 | 17 | -- |
| SBA | 688 SLAPPEY DR 115 1566 ALBANY 2J 115 1 | 155 | 90.7 | 95.3 | 678 ALBANY 115 1519 ALBANY 7J 115 1 | 4 | -- |
| SBA | 4430 BOULDDAM 115 4518 ELMORE 115 1 | 171 | 89.5 | 95.3 | 4529 FORBESRD 115 5067 WET DSTP 115 1 | 2 | -- |
| SBA | 581 KING MFG + 115 1483 DOVER TP 115 1 | 63 | 89.3 | 94.2 | 8 VOGTLE 500 9 W MCINTOSH 500 1 | 9 | -- |
| SBA | 4374 S.BESS 6 230 4950 DUNCANVL 230 1 | 502 | 72.7 | 94.0 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 15 | -- |
| SBA | 4156 MILLER6 230 4172 BOYLESM1 230 1 | 602 | 86.8 | 93.9 | 4234 CLAY 6 230 5312 CLAY 8 500 1 | 7 | -- |
| SBA | 4189 PRATCTY3 115 4261 ALAMETAL 115 1 | 246 | 86.8 | 93.7 | 4234 CLAY 6 230 5312 CLAY 8 500 1 | 7 | -- |
| SBA | 150 BONAIRE 230 804 BONAIRE 115 1 | 400 | 93.0 | 93.1 | 150 BONAIRE 230 804 BONAIRE 115 2 | 21 | -- |
| SBA | 150 BONAIRE 230 804 BONAIRE 115 2 | 400 | 93.0 | 93.1 | 150 BONAIRE 230 804 BONAIRE 115 1 | 21 | -- |
| SBA | 2035 S HALL 230 3067 CANDLER 230 1 | 509 | 91.2 | 93.6 | 3 NORCROSS 500 11 S HALL 500 1 | 18 | -- |
| SBA | 160 HATCH + 230 164 UNION SCHL 230 1 | 509 | 92.3 | 93.3 | 15 THALMANN 500 2380 THAL LS1 230 1 | 20 | -- |
| SBA | 8702 DANIEL 230 8705 MSPT EFR 230 1 | 866 | 91.0 | 93.0 | 4642 BIG CK 6 230 8702 DANIEL 230 1 | 1 | -- |
| SBA | 1729 W V RICA 115 2486 HICKORY LVL 115 1 | 124 | 85.6 | 93.0 | 184 BREMEN 230 969 BREMEN 115 1 | 14 | -- |
| SBA | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 480 | 89.7 | 92.9 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 12 | -- |
| SBA | 915 PINSON 115 1754 METAL CON 115 1 | 135 | 79.3 | 92.9 | 181 ROCKY MTN 230 182 HAMMOND 230 1 | 8 | -- |
| SBA | 488 ATHENA 115 1311 ATHENA 230 1 | 357 | 40.3 | 92.9 | 93 CENTER PR 230 1311 ATHENA 230 1 | 17 | -- |
| SBA | 131 FIRST AVE A 230 612 FIRST AVE + 115 1 | 298 | 92.0 | 92.3 | 132 FIRST AVE B 230 3011 LEE ROAD 230 1 | 10 | -- |
| SBA | 4311 GS STEEL 115 4334 MORG XRD 115 1 | 112 | 41.7 | 91.8 | 4234 CLAY 6 230 4247 ONEONTA6 230 1 | 19 | -- |
| SBA | 93 CENTER PR 230 1311 ATHENA 230 1 | 596 | 19.8 | 91.3 | 11 S HALL 500 306105 8OCONEE 500 1 | 17 | -- |
| SBA | 93 CENTER PR 230 2021 CLARKSBORO 230 1 | 433 | 46.1 | 90.6 | 11 S HALL 500 306105 8OCONEE 500 1 | 18 | -- |

# SERTP 2010 Economic Study Results
# December 2010

**Scenario Explanations:**

1) Barry Unit #5 Offline, Summer Peak Case
2) Bowen Unit #1 Offline, Shoulder (93% Load Level) Case
3) Bowen Unit #4 Offline, Summer Peak Case
4) Bowen Unit #4 Offline, Shoulder (93% Load Level) Case
5) Franklin Unit #2 Offline, Shoulder (93% Load Level) Case
6) Gadsden Unit #2 Offline, Shoulder (93% Load Level) Case
7) Gaston Unit #5 Offline, Summer Peak Case
8) Gaston Unit #5 Offline, Shoulder (93% Load Level) Case
9) Hatch Unit #1 Offline, Summer Peak Case
10) Hatch Unit #1 Offline, Shoulder (93% Load Level) Case
11) Hatch Unit #2 Offline, Summer Peak Case
12) Hammond Unit #4 Offline, Summer Peak Case
13) Hammond Unit #4 Offline, Shoulder (93% Load Level) Case
14) Harris Unit #1 Offline, Summer Peak Case
15) Kemper Co. Unit #Offline, Summer Peak Case
16) Kemper Co. Unit #Offline, Shoulder (93% Load Level) Case
17) McDonough Unit #5 Offline, Summer Peak Case
18) Scherer Unit #1 Offline, Summer Peak Case
19) Scherer Unit #1 Offline, Shoulder (93% Load Level) Case
20) Smith Unit #3 Offline, Summer Peak Case
21) Vogtle Unit #1 Offline, Summer Peak Case

## Duke Border to the SBA: Transfer Flows within the SERTP

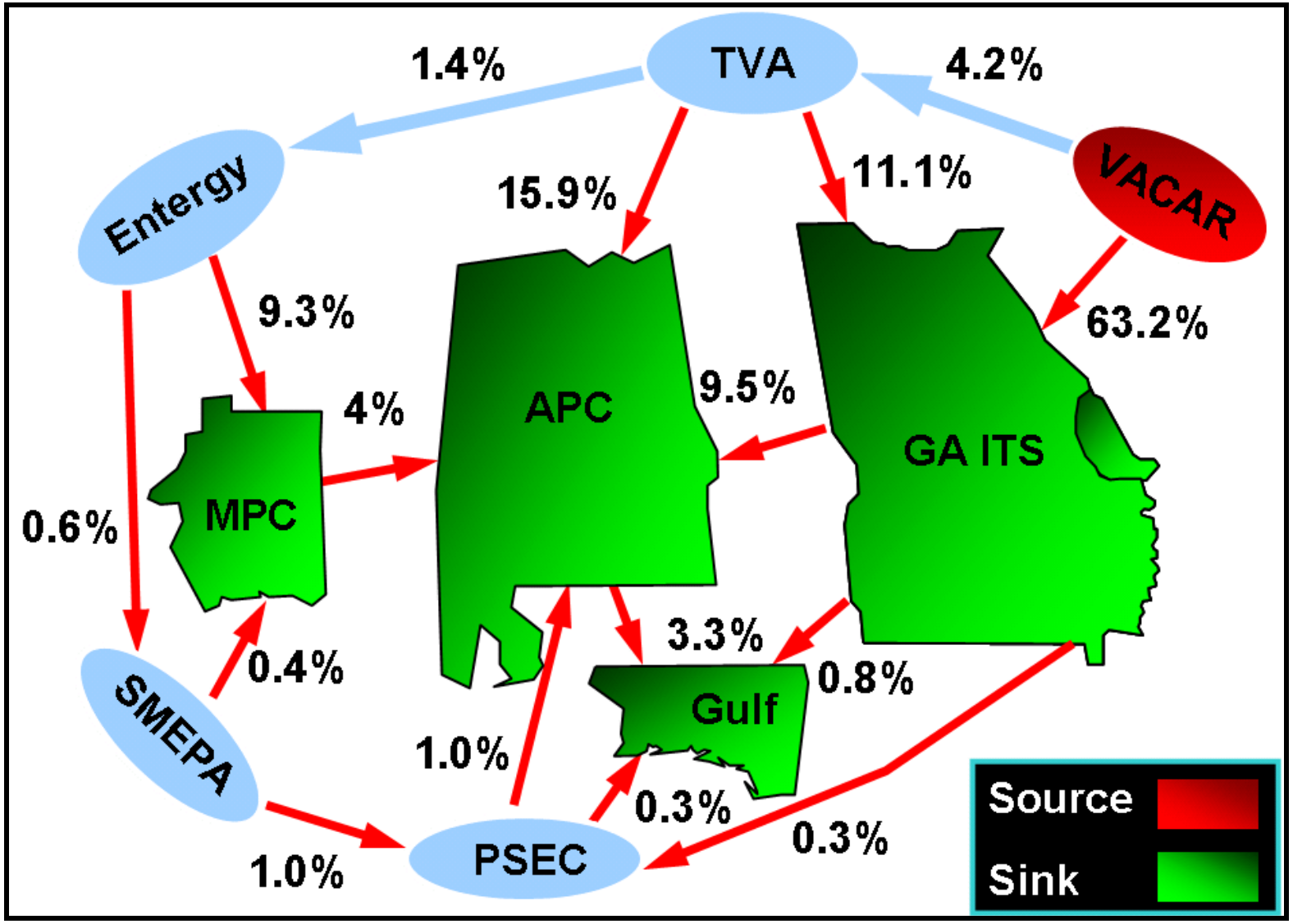


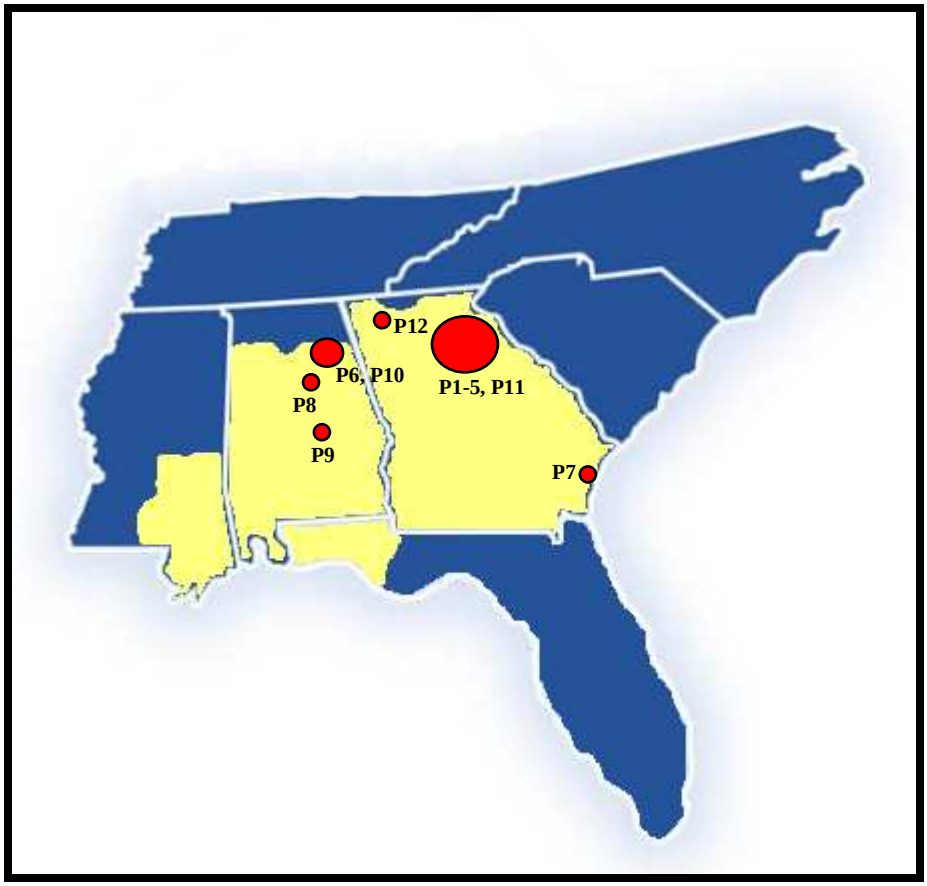
**Table 4.5. Potential Solutions for Identified Constraints – *Southern Balancing Authority***

The following projects are potential solutions to address the identified constraints and are 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 current projected enhancements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission system expansion plans could also impact the results of this study. These potential solutions only address constraints identified within the Southern Balancing Area that are associated with the proposed transfer. Other Balancing Areas were not monitored which could result in additional limitations and required system improvements.

| Item | Potential Solution | Estimated Need Date | Estimated Cost |
|---|---|---|---|
| **P1** | • Construct approximately 36 miles of bundled 2-1351 ASCR 230 kV transmission line at 100°C from Hartwell Dam to Athena. | 2016 | $50,128,000(1) |
| **P2** | • Replace the existing 1590 AAC jumpers and main bus at Athena with 2-1590 AAC jumpers/bus. | 2016 | $165,000 |
| **P3** | • Replace the existing 750 AAC jumpers at Center with 2-750 AAC jumpers | 2016 | $51,000 |
| **P4** | • Reconductor approximately 14.0 miles of 230 kV transmission line with 1351 ACSR at 100 ºC from Winder Primary to Clarksboro | 2016 | $8,930,000 |
| **P5** | • Reconductor approximately 8.39 miles of 230 kV transmission line with bundled 2-1033 ACSR at 100 ºC from South Hall to Spout.<br>• Construct approximately 12 miles of 1351 ACSR 230 kV transmission line at 100 ºC from Suwanee to Spout. | 2016 | $20,113,000 |
| **P6** | • Reconductor approximately 0.05 miles of the 19.6 mile 161 kV transmission line with 1351 ACSR at 100 ℃ from Attalla to Albertville.<br>• Replace the existing two (2) 161/115 kV Autobanks with two (2) 200 MVA Autobanks. | 2016 | $6,600,000(1) |
| **P7** | • Reconductor approximately 6.8 miles of 230 kV transmission line with 1351 ACSR at 100 ºC from West Brunswick to Thalmann. | 2016 | $4,337,000 |
| **P8** | • Reconductor approximately 50.7 miles of 230 kV transmission line with 1351 ACSS at 160 ºC from Power Systems Development Facility to County Line Road. | 2016 | $37,400,000 |
| **P9** | • Upgrade approximately 25.9 miles of 1033 ACSR 230 kV transmission line from 75 ℃ to 100 ℃ operation from North Selma to Autaugaville. | 2016 | $6,847,000 |
| **P10** | • Reconductor approximately 3.66 miles of 115 kV transmission line with 795 ACSR at 100 ℃ from Gulf States Steel to Keystone Tap. | 2016 | $1,486,000 |
| **P11** | • Reconductor approximately 2.98 miles of 115 kV transmission line with 1351 ACSR at 100 ºC from Lawrenceville to Lawrenceville #3. | 2016 | $1,382,000 |
| **P12** | • Upgrade approximately 3.3 miles of 477 ACSR 115 kV transmission line from 50 ℃ to 75 ℃ operation from Celanese to Calhoun Road. | 2016 | $765,000 |
| **TOTAL (2016$)** | | | $138,204,000 |

(1) This transmission solution was proposed to alleviate the loading of a tie-line constraint between the SBA and a non-participating Transmission Owner. Therefore, the cost associated with the transmission solution is only for the portion of solution that is located within the participating Transmission Owners' territory. This solution effectively alleviates the identified constraint(s), however, the impacts to adjacent transmission systems that are external to the participating Transmission Owners were not evaluated. These impacts, as well as coordinated transmission solutions to alleviate any identified constraints, can be determined if this transfer is brought forth to be evaluated in the Southeast Inter-Regional Participation Process ("SIRPP").

**Diagram 4.1. Approximate Location of Potential Solutions**



## Interchange Assumptions

**Table 4.6. Transactions Modeled in Starting Point Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *735231* | *SOCO* | *Duke* | *50* |
| *735232* | *SOCO* | *Duke* | *25* |
| *823644* | *SOCO* | *Duke* | *90* |
| *823646* | *SOCO* | *Duke* | *90* |
| *787707* | *SOCO* | *TVA* | *73* |
| *672440* | *TVA* | *SOCO* | *208* |
| *77603* | *SOCO* | *PSEC* | *114* |
| *765080* | *PSEC* | *SOCO* | *1092* |
| -- | *SOCO* | *PSEC* | *5* |
| -- | *MEAG* | *PSEC* | *62* |
| -- | *GTC* | *PSEC* | *30* |
| -- | *SOCO* | *PSEC* | *267* |
| -- | *SEPA* | *SOCO* | *681* |
| -- | *SBA* | *FRCC* | *2435 / 3700*[(1)] |

[(1)]Southern performed studies with both 2435 MW and 3700 MW of interchange between Florida and the SBA

**Table 4.7. Additional Transactions Modeled in Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *869848* | *EES* | *SOCO* | *150* |
| *814051* | *EES* | *SOCO* | *50* |
| *854479* | *EES* | *SOCO* | *196* |
| *705288* | *EES* | *Duke* | *50* |
| *705289* | *EES* | *Duke* | *100* |
| *869847* | *Duke* | *SOCO* | *50* |
| *147617* | *SC* | *GTC* | *296* |
| *147616* | *SCEG* | *GTC* | *285* |
| *147615* | *Duke* | *GTC* | *465* |
| *147613* | *TVA* | *GTC* | *310* |
| *72133712* | *Duke* | *MEAG* | *50* |

**Table 4.8. Capacity Benefit Margin Modeled (CBM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *Duke* | *310* |
| *Southern* | *TVA* | *400* |
| *Southern* | *EES* | *100* |
| *Southern* | *SCPSA* | *120* |
| *Southern* | *SCEG* | *120* |
| *GTC* | *TVA* | *221* |
| *GTC* | *Duke* | *104* |
| *GTC* | *SCEG* | *47* |
| *GTC* | *SCPSA* | *28* |

For more information on Southern's CBM, click here.
For more information on GTC's CBM, click here.

**Table 4.9. Transmission Reliability Margins Modeled (TRM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *From Duke* | *199.46* |
| *GTC* | *From Duke* | *100.65* |
| *MEAG* | *From Duke* | *26.26* |
| *Dalton* | *From Duke* | *3.53* |
| *Southern* | *From Entergy* | *205.01* |
| *Southern* | *From TVA* | *233.43* |
| *GTC* | *From TVA* | *48.57* |
| *MEAG* | *From TVA* | *12.67* |
| *Dalton* | *From TVA* | *1.70* |

For more information on the Southern Balancing Authority's TRM, click here.

# *Murray County, GA to Mississippi*

# *600 MW*

## Study Structure and Assumptions

| Transfer Sensitivity | Transfer Amount | Transfer Source | Transfer Sink | Study Year |
|---|---|---|---|---|
| Murray Co., GA to MS | 600 MW | Murray County, GA. | MS | 2016 |
| **Load Flow Cases** | | | | |
| 2010 Series Version 2C Cases: Summer Peak and Shoulder (93% load level) | | | | |
| **Source Modeled** | | | | |
| The source for this transfer was assumed to be a new generator interconnecting to the 500 kV near Murray County, GA. | | | | |
| **Sink Modeled** | | | | |
| The sink for this transfer was SMEPA and Mississippi Power Company Generation allocated based on their respective load serving ratios in the 2016 load flow cases utilized. | | | | |

### Transmission System Impacts

Tables 5.1 through 5.2 below identify thermal constraints attributable to the requested transfer for the contingency and scenario that resulted in the highest facility loading for the conditions studied. Other unit out scenarios or contingencies may also result in constraints to these or other facilities.

**Table 5.1. Pass 0 – Transmission System Impacts With No Enhancements – *Southern Balancing Authority***

The following table identifies significant constraints in the Southern Balancing Authority ("SBA") without any enhancements to the transmission system. The 600 MW transfer from Murray County, GA to Mississippi results in overloads of several 115 kV and 230 kV facilities.

| | | | Thermal Loadings (%) | | | | |
|---|---|---|---|---|---|---|---|
| **AREA** | **Limiting Element** | **Rating (MVA)** | **Without Request** | **With Request** | **Contingency** | **Scenario** | **Project** |
| **The following constraints have been identified as directly attributable to the above defined transfer.** | | | | | | | |
| SBA | 4475 DEMOP TS 115 4476 CEMEX 115 1 | 138 | 95.4 | 100.1 | 4471 GREENCO6 230 8006 MDN EAST 230 1 | 4 | P1 |
| SBA | 4480 LIVINGST 115 4968 MANINGTP 115 1 | 91 | 93.8 | 100.2 | 4475 DEMOP TS 115 4476 CEMEX 115 1 | 4 | P2 |
| SBA | 251 E POINT B2 115 264 E POINT 4 115 1 | 187 | 99.9 | 100.2 | 240 E POINT B1 115 303 COL PK #3 J 115 1 | 24 | P3 |
| SBA | 4475 DEMOP TS 115 4832 NAHEO SS 115 1 | 112 | 92.0 | 100.3 | 4470 GREENCO3 115 5243 BW-BOGUE 115 1 | 10 | P4 |
| SBA | 5203 AIRPT LN 115 5706 BNTBRKTP 115 1 | 138 | 99.4 | 100.3 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 31 | P5 |
| SBA | 17012 BREWTON 115 17014 3EXXON_PS 115 1 | 85 | 91.1 | 101.8 | 4612 BREWT TP 115 4622 N BREW 3 115 1 | 2 | P6 |
| SBA | 4996 POWERSYS 230 5058 FAYETVIL 230 1 | 502 | 96.6 | 101.1 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 19 | P7 |

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 4400 GASTON 230 4996 POWERSYS 230 1 | 497 | 97.8 | 102.6 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 19 | P8 |
| SBA | 4740 GKN W LD 115 5257 HALACLTP 115 1 | 107 | 97.8 | 103.0 | 4514 S MONTG3 115 4547 PINEDALE 115 1 | 13 | P9 |

**Table 5.2. Pass 1 – Transmission System Impacts With All Proposed Enhancements – *Southern Balancing Authority***

The following table identifies constraints in the Southern Balancing Authority ("SBA") with all proposed enhancements applied to the transmission system. The resulting facilities in the table below could become potential constraints in future years or with different queuing assumptions, but are not overloaded in the 2016 study year.

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| **The following facilities could become potential constraints in future years or with different queuing assumptions** | | | | | | | |
| SBA | 165 W BRUNSWICK 230 2592 THALMANN 2 230 1 | 509 | 99.8 | 100.0 | 2380 THAL LS1 230 2591 THALMANN 1 230 1 | 16 | -- |
| SBA | 618 S COLUMBUS 115 1102 FT MITCHELL 115 1 | 104 | 98.6 | 100.0 | 10 FORTSON 500 24 N TIFTON 500 1 | 14 | -- |
| SBA | 4942 E.PRATVL 115 5898 CO LINE3 115 1 | 216 | 98.4 | 99.6 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 14 | -- |
| SBA | 117 WAYNESBORO 230 562 WAYNESBORO 115 1 | 280 | 99.0 | 99.4 | 117 WAYNESBORO 230 118 WADLEY PRI 230 1 | 16 | -- |
| SBA | 4556 E GRENVL 115 4557 GREENVL3 115 1 | 138 | 98.5 | 99.4 | 4510 W MONTG3 115 4846 WELLRDTP 115 1 | 10 | -- |
| SBA | 4508 MONTG SS 230 5500 AUTAUG6 230 1 | 1243 | 98.2 | 99.2 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 14 | -- |
| SBA | 5003 GRANTMIL 115 5191 MTSITETP 115 1 | 138 | 96.7 | 98.9 | 4988 S.JEFF 3 115 4989 S.JEFF 6 230 1 | 15 | -- |
| SBA | 1882 N CAMILLA 230 2510 RACCOON CK 230 1 | 509 | 96.9 | 98.8 | 218 S BAINBRDGE 230 4601 FARLEY 6 230 1 | 22 | -- |
| SBA | 461 JACKSON LK 115 1917 S COV J 115 1 | 71 | 96.4 | 98.6 | 746 S GRIFFIN 115 750 GA BRD CORR 115 1 | 16 | -- |
| SBA | 17014 3EXXON_PS 115 17023 WNDCKJCT 115 1 | 85 | 87.8 | 98.5 | 4612 BREWT TP 115 4622 N BREW 3 115 1 | 2 | -- |
| SBA | 193 WOODSTOCK 230 1211 RAGSDALE RD 230 1 | 497 | 95.6 | 97.7 | 4 BULL SLUICE 500 19 BIG SHANTY 500 1 | 25 | -- |
| SBA | 591 HINESVILLE 115 2140 DORCHESTER 115 1 | 216 | 97.1 | 97.6 | 9052 LT OGEECHEE 115 9144 RICH HL TAP 115 1 | 16 | -- |
| SBA | 232 S COBB DR 115 1265 OAKDALE J 115 1 | 112 | 97.3 | 97.5 | 977 HICKS RD 115 998 W MARIETTA 115 1 | 21 | -- |
| SBA | 363 HOPEWELL 115 1714 BIRMINGHAM 115 1 | 188 | 96.9 | 97.3 | 956 HOLLY SP 115 1722 NEWLIGHT CH 115 1 | 11 | -- |
| SBA | 4488 N SELMA3 115 4489 N SELMA6 230 1 | 302 | 96.3 | 97.3 | 4488 N SELMA3 115 4489 N SELMA6 230 2 | 27 | -- |
| SBA | 4113 FISH RV CAP 115 4664 FAIRHOPE 115 1 | 135 | 95.9 | 97.1 | 4141 SW FOLEY 115 4641 SILVER 3 115 1 | 12 | -- |
| SBA | 7500 ALFORD T 115 7910 BAY CNTY 115 1 | 67 | 94.9 | 97.1 | 7527 SINAICEM 230 7836 L SMITH 230 1 | 22 | -- |
| SBA | 4700 BARRY 6 230 5148 SSAB 230 1 | 662 | 92.5 | 97.0 | 4638 CHICK 6 230 4700 BARRY 6 230 1 | 3 | -- |
| SBA | 4113 FISH RV CAP 115 17996 FISHRVTP 115 1 | 135 | 95.8 | 96.9 | 4141 SW FOLEY 115 4641 SILVER 3 115 1 | 12 | -- |
| SBA | 4443 THURLOW 115 4445 YATESDAM 115 1 | 117 | 95.4 | 96.4 | 4534 AUB MONT 115 5136 MADPARK3 115 1 | 13 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 208 NELSON 230 954 NELSON 115 2 | 176 | 94.7 | 96.1 | 208 NELSON 230 954 NELSON 115 1 | 1 | -- |
| SBA | 8025 MERIDIAN 115 8055 FLINTKTE 115 1 | 78 | 91.5 | 96.1 | 8065 SWEATT 230 8066 SWEATT 115 1 | 3 | -- |
| SBA | 596 RICEBORO 115 2142 CAY CRK 115 1 | 188 | 95.1 | 96.0 | 15 THALMANN 500 2158 MCCALL RD 500 1 | 17 | -- |
| SBA | 741 JONESBORO 115 1911 SPIVEY LK 115 1 | 298 | 95.8 | 95.9 | 742 STOCKBRIDGE 115 1913 STOCKBRIDGE 230 1 | 24 | -- |
| SBA | 8273 HWY 11 115 8275 HBG CNTY 115 1 | 135 | 92.3 | 95.9 | 8245 PETAL 115 8251 HATBG NO 115 1 | 10 | -- |
| SBA | 434 LAWRENCEVL 115 1363 LAWRNCEVL 3 115 1 | 188 | 95.4 | 95.7 | 1937 BAY CREEK 115 2070 LAWVL 4J 115 1 | 7 | -- |
| SBA | 4200 BESSEMER 115 5060 GREENWD 115 1 | 216 | 95.1 | 95.7 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 31 | -- |
| SBA | 2522 SONAT ELL J 230 3020 TALBOT CO 1 230 1 | 433 | 95.0 | 95.7 | 13 BONAIRE 500 2345 SMARR 500 1 | 17 | -- |
| SBA | 4640 SILVER 6 230 4641 SILVER 3 115 2 | 336 | 93.5 | 95.3 | 4640 SILVER 6 230 4641 SILVER 3 115 1 | 3 | -- |
| SBA | 4484 CUBA 115 8045 KEWNE TP 115 1 | 117 | 84.9 | 95.3 | 4471 GREENCO6 230 8006 MDN EAST 230 1 | 4 | -- |
| SBA | 4640 SILVER 6 230 4641 SILVER 3 115 1 | 336 | 93.4 | 95.2 | 4640 SILVER 6 230 4641 SILVER 3 115 2 | 3 | -- |
| SBA | 5060 GREENWD 115 5203 AIRPT LN 115 1 | 216 | 94.3 | 94.9 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 31 | -- |
| SBA | 4594 WEBB 3 115 4602 ECI WEBB 115 1 | 216 | 87.8 | 94.9 | 4595 WEBB 6 230 4598 PINCK 6 230 1 | 2 | -- |
| SBA | 131 FIRST AVE A 230 612 FIRST AVE + 115 1 | 298 | 94.0 | 94.6 | 132 FIRST AVE B 230 612 FIRST AVE + 115 1 | 28 | -- |
| SBA | 4600 FARLEY 8 500 4601 FARLEY 6 230 1 | 1195 | 88.5 | 94.5 | 4600 FARLEY 8 500 4601 FARLEY 6 230 2 | 13 | -- |
| SBA | 4600 FARLEY 8 500 4601 FARLEY 6 230 2 | 1195 | 88.5 | 94.5 | 4600 FARLEY 8 500 4601 FARLEY 6 230 1 | 13 | -- |
| SBA | 4400 GASTON 230 4996 POWERSYS 230 1 | 497 | 89.5 | 94.3 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 19 | -- |
| SBA | 1055 BARNEYVILLE 115 1883 ADEL 1J 115 1 | 142 | 92.1 | 94.2 | 220 PINE GROVE 230 222 N TIFTON 230 1 | 22 | -- |
| SBA | 17015 FREEMAN 115 17023 WNDCKJCT 115 1 | 85 | 83.3 | 94.1 | 4612 BREWT TP 115 4622 N BREW 3 115 1 | 2 | -- |
| SBA | 202 CARTERS DAM 230 3502 CARTERSDAM1 13. 1 | 157 | 93.8 | 93.9 | Base Case | 26 | -- |
| SBA | 202 CARTERS DAM 230 3503 CARTERSDAM2 13. 1 | 157 | 93.8 | 93.9 | Base Case | 26 | -- |
| SBA | 4470 GREENCO3 115 5243 BW-BOGUE 115 1 | 138 | 85.9 | 93.8 | 4475 DEMOP TS 115 4832 NAHEO SS 115 1 | 10 | -- |
| SBA | 977 HICKS RD 115 993 FONTAINE J 115 1 | 135 | 93.5 | 93.7 | 216 JACK MCD2 115 232 S COBB DR 115 1 | 21 | -- |
| SBA | 612 FIRST AVE + 115 616 BLNCHARD IP 115 1 | 199 | 93.1 | 93.4 | 612 FIRST AVE + 115 1561 RIVERFRONTJ 115 1 | 14 | -- |
| SBA | 742 STOCKBRIDGE 115 1913 STOCKBRIDGE 230 1 | 344 | 93.2 | 93.3 | 741 JONESBORO 115 1911 SPIVEY LK 115 1 | 23 | -- |
| SBA | 224 OFFERMAN 230 1093 OFFERMAN 115 2 | 155 | 92.8 | 93.3 | 224 OFFERMAN 230 1093 OFFERMAN 115 1 | 6 | -- |
| SBA | 8245 PETAL 115 8251 HATBG NO 115 1 | 155 | 89.9 | 93.3 | 8271 HATBG SW 115 8273 HWY 11 115 1 | 10 | -- |
| SBA | 6783 LSMITH 3 18. 7837 SMITH#3CB 230 1 | 250 | 92.8 | 93.0 | Base Case | 29 | -- |
| SBA | 938 CARTERVL 4 115 983 CARTERVL 1J 115 1 | 269 | 92.6 | 93.0 | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 5 | -- |
| SBA | 4753 PCLEARTP 115 4956 FAIRHCAP 115 1 | 91 | 91.9 | 93.0 | 4141 SW FOLEY 115 4641 SILVER 3 115 1 | 12 | -- |
| SBA | 4996 POWERSYS 230 5058 FAYETVIL 230 1 | 502 | 88.2 | 92.9 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 19 | -- |
| SBA | 66 SCOTTDALE 230 357 SCOTTDALE 115 1 | 280 | 92.5 | 92.8 | 286 GRADY 1&2 115 1215 R_GRADY 115 1 | 9 | -- |
| SBA | 132 FIRST AVE B 230 612 FIRST AVE + 115 1 | 298 | 92.1 | 92.8 | 131 FIRST AVE A 230 612 FIRST AVE + 115 1 | 28 | -- |

# SERTP 2010 Economic Study Results
# December 2010

| AREA | Limiting Element | Rating (MVA) | Thermal Loadings (%) Without Request | Thermal Loadings (%) With Request | Contingency | Scenario | Project |
|---|---|---|---|---|---|---|---|
| SBA | 615 VICTORY DR 115 616 BLNCHARD IP 115 1 | 199 | 92.4 | 92.7 | 612 FIRST AVE + 115 1561 RIVERFRONTJ 115 1 | 14 | -- |
| SBA | 160 HATCH + 230 164 UNION SCHL 230 1 | 509 | 92.0 | 92.6 | 15 THALMANN 500 2380 THAL LS1 230 1 | 14 | -- |
| SBA | 1093 OFFERMAN 115 1106 BLKSHEAR J 115 1 | 124 | 91.6 | 92.3 | 223 DOUGLAS 230 1810 WILSONVILLE 230 1 | 22 | -- |
| SBA | 621 YATES 115 3643 YATES 3 13. 1 | 125 | 92.0 | 92.1 | Base Case | 30 | -- |
| SBA | 935 CARTERSVL 115 938 CARTERVL 4 115 1 | 298 | 91.7 | 92.1 | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 5 | -- |
| SBA | 194 S ACWORTH 230 943 S ACWORTH 115 1 | 400 | 91.6 | 92.1 | 935 CARTERSVL 115 938 CARTERVL 4 115 1 | 5 | -- |
| SBA | 2140 DORCHESTER 115 2152 DORCHESTER 230 1 | 373 | 91.3 | 92.1 | 15 THALMANN 500 2158 MCCALL RD 500 1 | 17 | -- |
| SBA | 144 COTTON 230 1882 N CAMILLA 230 1 | 509 | 90.2 | 92.0 | 218 S BAINBRDGE 230 4601 FARLEY 6 230 1 | 22 | -- |
| SBA | 17018 BELLVIL3 115 17225 CSTLBRYJ 115 1 | 142 | 89.7 | 91.9 | 4629 EMCSTOCK 115 4701 BARRY 3 115 1 | 12 | -- |
| SBA | 224 OFFERMAN 230 1093 OFFERMAN 115 1 | 160 | 91.2 | 91.7 | 224 OFFERMAN 230 1093 OFFERMAN 115 2 | 6 | -- |
| SBA | 4508 MONTG SS 230 5897 CO LINE6 230 1 | 502 | 88.9 | 91.5 | 4512 SNOWDN8 500 5178 AUTAUSS8 500 1 | 14 | -- |
| SBA | 5257 HALACLTP 115 17995 HARDWYTP 115 1 | 107 | 86.1 | 91.3 | 4514 S MONTG3 115 4547 PINEDALE 115 1 | 13 | -- |
| SBA | 5058 FAYETVIL 230 5897 CO LINE6 230 1 | 502 | 86.5 | 91.2 | 5123 BILLNGSS 500 5178 AUTAUSS8 500 1 | 20 | -- |
| SBA | 4599 DOTHAN 115 4602 ECI WEBB 115 1 | 216 | 84.1 | 91.2 | 4595 WEBB 6 230 4598 PINCK 6 230 1 | 2 | -- |
| SBA | 228 LOCKWIND J 115 1707 MAR 12 J 115 1 | 155 | 91.0 | 91.1 | 216 JACK MCD2 115 231 KING SP RD 115 1 | 11 | -- |
| SBA | 8560 WGNS 5AV 115 8562 COASTPAP 115 1 | 107 | 90.8 | 91.1 | 8530 LANDON 115 8532 HWY 53 115 1 | 8 | -- |
| SBA | 4554 LAMAR RD 115 4737 HOPEHULL 115 1 | 138 | 83.6 | 91.1 | 4557 GREENVL3 115 4558 GREENVL6 230 1 | 10 | -- |
| SBA | 4574 MCINOLIN 115 5160 TATELYLE 115 1 | 216 | 84.0 | 91.0 | 4586 W MCTSH6 230 5313 CALVRTSS 230 1 | 10 | -- |
| SBA | 5125 ELLICOTT 230 5175 GEORGETN 230 1 | 485 | 83.6 | 91.0 | 4638 CHICK 6 230 4700 BARRY 6 230 1 | 3 | -- |
| SBA | 4361 MCADORTP 115 5706 BNTBRKTP 115 1 | 138 | 90.0 | 90.9 | 4374 S.BESS 6 230 5036 S BESS 3 115 1 | 31 | -- |
| SBA | 1049 N TIFTON 115 1858 TIFTON J 115 1 | 180 | 88.7 | 90.7 | 222 N TIFTON 230 1875 E MOULTRIE 230 1 | 22 | -- |
| SBA | 4576 LINDENTS 115 5243 BW-BOGUE 115 1 | 138 | 82.8 | 90.7 | 4475 DEMOP TS 115 4832 NAHEO SS 115 1 | 10 | -- |
| SBA | 911 ARMUCHEE J 115 914 GALEY&LORD+ 115 1 | 96 | 90.1 | 90.6 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 18 | -- |
| SBA | 914 GALEY&LORD+ 115 915 PINSON 115 1 | 96 | 90.1 | 90.6 | 907 HAMMOND 115 2403 COOSA J1 115 1 | 18 | -- |
| SBA | 17012 BREWTON 115 17225 CSTLBRYJ 115 1 | 142 | 88.3 | 90.5 | 4629 EMCSTOCK 115 4701 BARRY 3 115 1 | 12 | -- |
| SBA | 5160 TATELYLE 115 5327 FL GAS TAP 115 1 | 216 | 83.5 | 90.5 | 4586 W MCTSH6 230 5313 CALVRTSS 230 1 | 10 | -- |
| SBA | 208 NELSON 230 954 NELSON 115 1 | 180 | 89.0 | 90.4 | 208 NELSON 230 954 NELSON 115 2 | 1 | -- |
| SBA | 164 UNION SCHL 230 224 OFFERMAN 230 1 | 509 | 89.8 | 90.4 | 15 THALMANN 500 2380 THAL LS1 230 1 | 22 | -- |
| SBA | 2140 DORCHESTER 115 2142 CAY CRK 115 1 | 216 | 89.6 | 90.4 | 15 THALMANN 500 2158 MCCALL RD 500 1 | 17 | -- |
| SBA | 130 GOAT ROCK 230 609 GOAT ROCK 115 1 | 312 | 90.0 | 90.1 | 131 FIRST AVE A 230 612 FIRST AVE + 115 1 | 28 | -- |

**Scenario Explanations:**

1) Scherer Unit #1 Offline, Summer Peak Case

2) Crist Unit #7 Offline, Summer Peak Case

3) Daniel CC Unit #2 Offline, Summer Peak Case
4) Kemper Unit #1 Offline, Summer Peak Case
5) McDonough Unit #5 Offline, Summer Peak Case
6) Smith Unit #3 Offline, Summer Peak Case
7) Vogtle Unit #1 Offline, Summer Peak Case
8) Watson Unit #5 Offline, Summer Peak Case
9) Athens Area CTs Offline, Summer Peak Case
10) Barry Unit #5 Offline, Summer Peak Case
11) Bowen Unit #4 Offline, Summer Peak Case
12) Crist Unit #7 Offline, Summer Peak Case
13) Farley Unit #1 Offline, Summer Peak Case
14) Farley Unit #2 Offline, Summer Peak Case
15) Gorgas Unit #10 Offline, Summer Peak Case
16) Hatch Unit #1 Offline, Summer Peak Case
17) Hatch Unit #2 Offline, Summer Peak Case
18) Hammond Unit #4 Offline, Summer Peak Case
19) Harris Unit #1 Offline, Summer Peak Case
20) Harris Unit #2 Offline, Summer Peak Case
21) McDonough Unit #5 Offline, Summer Peak Case
22) Smith Unit #3 Offline, Summer Peak Case
23) Vogtle Unit #1 Offline, Summer Peak Case
24) Vogtle Unit #2 Offline, Summer Peak Case
25) Yates Unit #7 Offline, Summer Peak Case
26) Barry Unit #5 Offline, Shoulder (93% Load Level) Case
27) Farley Unit #1 Offline, Shoulder (93% Load Level) Case
28) Farley Unit #2 Offline, Shoulder (93% Load Level) Case
29) Franklin Unit #2 Offline, Shoulder (93% Load Level) Case
30) Gorgas Unit #10 Offline, Shoulder (93% Load Level) Case

## Murray County, GA to Mississippi: Transfer Flows within the SERTP

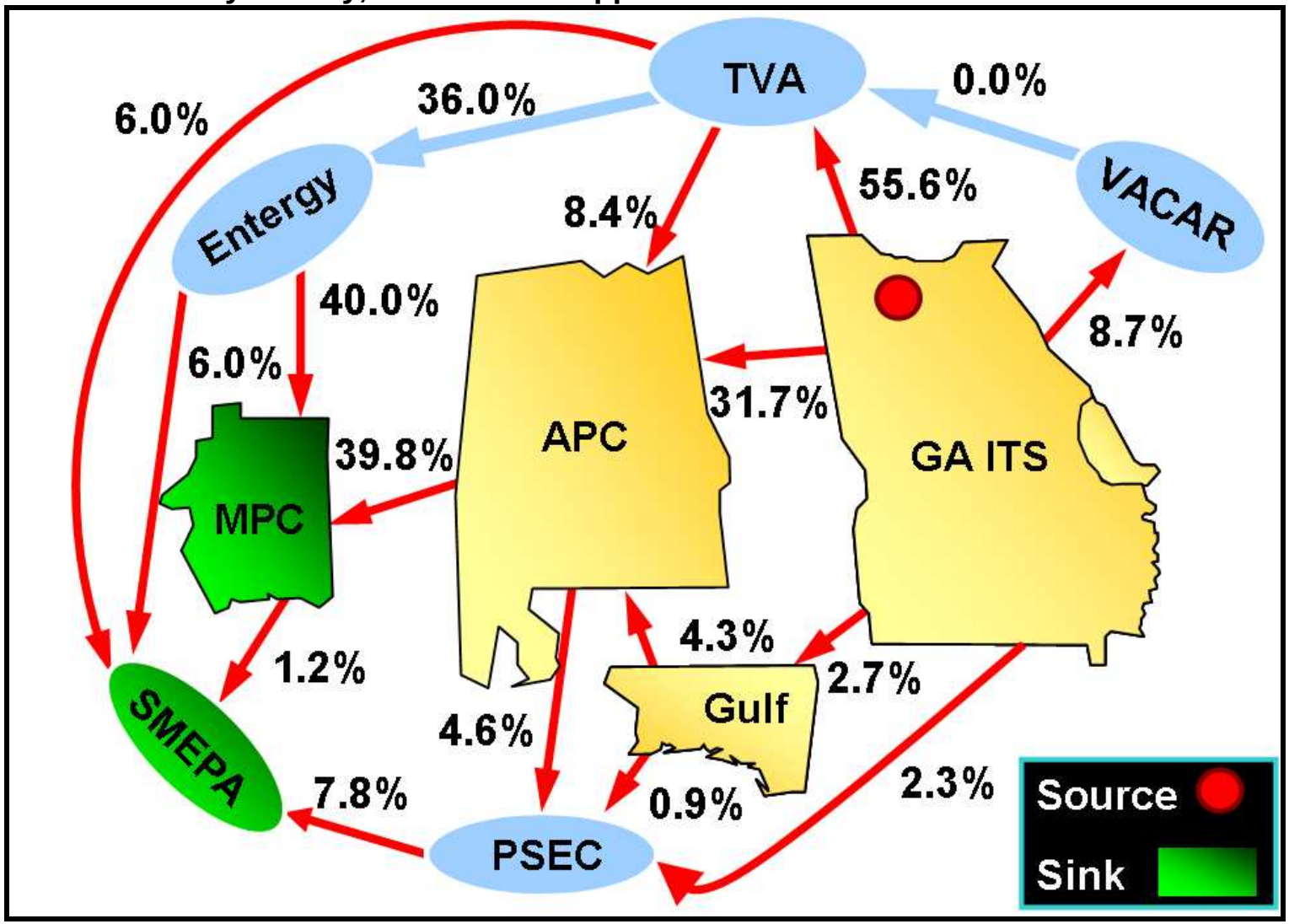
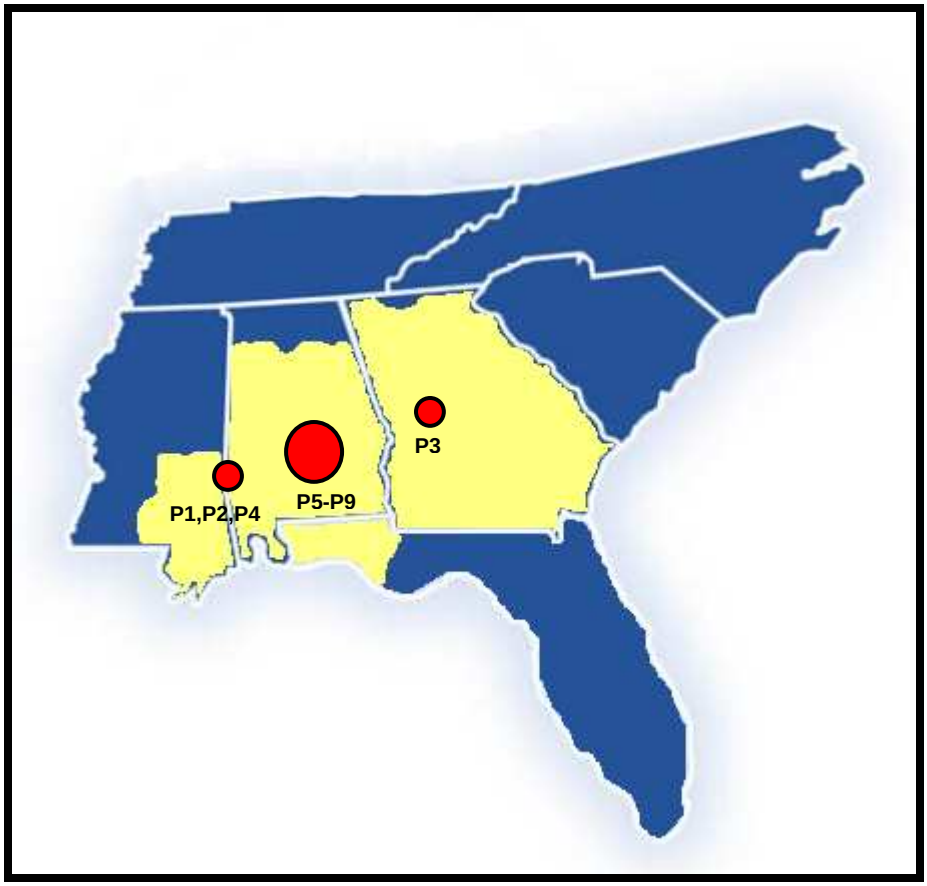


**Table 5.3. Potential Solutions for Identified Constraints – *Southern Balancing Authority***
The following projects are potential solutions to address the identified constraints and are based on the assumptions used in this study. It must be noted that changes to the load forecast, and/or changes in the expansion plan could occur, and would impact the results of this study. In addition, the current projected enhancements to the transmission system were modeled in the cases. Changes to system conditions and/or the transmission system expansion plans could also impact the results of this study. These potential solutions only address constraints identified within the Southern Balancing Area that are associated with the proposed transfer. Other Balancing Areas were not monitored which could result in additional limitations and required system improvements.

| Item | Potential Solution | Estimated Need Date | Estimated Cost |
|---|---|---|---|
| **P1** | • Reconductor approximately 0.7 miles of 397 ACSR 115 kV transmission line with 795 26/7 ACSR at 100 ℃ f rom Demopolis TS to CEMEX. | 2016 | $304,000 |
| **P2** | • Reconductor approximately 5.1 miles of 4/0 ACSR 115 kV transmission line with 795 26/7 ACSR at 100 ℃ f rom Livingston to Mannington. | 2016 | $2,366,000 |
| **P3** | • Reconductor approximately 2.7 miles with 1033 ACSR 115 kV transmission line at 100 ºC from Willingham Drive to East Point. | 2016 | $2,400,000 |
| **P4** | • Upgrade approximately 28.3 miles of 397.5 26/7 ACSR at 75℃ 115 kV transmission line to 100 ℃ operatio n from Demopolis TS to Naheola SS. | 2016 | $6,564,000 |
| **P5** | • Reconductor approximately 0.34 miles of 397 ACSR 115 kV transmission line with 795 26/7 ACSR 100 ℃ Airp ort Lane to Bentbrook Tap. | 2016 | $148,000 |
| **P6** | • Construct a new 795 ACSS at 160 ℃ 115 kV transmission line from the North Brewton T.S. – North Brewton D.S. Also a new Normally Open point would be created between Brewton tap and Brewton T.S. | 2016 | $6,409,000 |
| **P7** | • Reconductor approximately 8 miles of 795 ACSR 230 kV transmission line with 1033 54/7 ACSS at 160 ℃ fro m Power Systems Development Facility to Fayetteville. | 2016 | $9,278,000 |
| **P8** | • Replace the existing 230 kV line traps on the Gaston to Power Systems Development Facility 230 kV transmission line with 2000 A line traps. | 2016 | $300,000 |
| **P9** | • Reconductor approximately 3.1 miles of 266.8 ACSR 115 kV transmission line with 795 26/7 ACSR at 100 ℃ f rom GKN Westland Aerospace to Halla Climate Control Tap. | 2016 | $1,100,000 |
| **TOTAL (2016$)** | | | **$ 28,869,000** |

**Diagram 5.1. Approximate Location of Potential Solutions**



## Interchange Assumptions

**Table 5.4. Transactions Modeled in Starting Point Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *735231* | *SOCO* | *Duke* | *50* |
| *735232* | *SOCO* | *Duke* | *25* |
| *823644* | *SOCO* | *Duke* | *90* |
| *823646* | *SOCO* | *Duke* | *90* |
| *787707* | *SOCO* | *TVA* | *73* |
| *672440* | *TVA* | *SOCO* | *208* |
| *77603* | *SOCO* | *PSEC* | *114* |
| *765080* | *PSEC* | *SOCO* | *1092* |
| -- | *SOCO* | *PSEC* | *5* |
| -- | *MEAG* | *PSEC* | *62* |
| -- | *GTC* | *PSEC* | *30* |
| -- | *SOCO* | *PSEC* | *267* |
| -- | *SEPA* | *SOCO* | *681* |
| -- | *SBA* | *FRCC* | *2435 / 3700*[(1)] |

[(1)]Southern performed studies with both 2435 MW and 3700 MW of interchange between Florida and the SBA

**Table 5.5. Additional Transactions Modeled in Cases**

| OASIS Ref. # | POR | POD | Amount (MW) |
|---|---|---|---|
| *869848* | *EES* | *SOCO* | *150* |
| *814051* | *EES* | *SOCO* | *50* |
| *854479* | *EES* | *SOCO* | *196* |
| *705288* | *EES* | *Duke* | *50* |
| *705289* | *EES* | *Duke* | *100* |
| *869847* | *Duke* | *SOCO* | *50* |
| *147617* | *SC* | *GTC* | *296* |
| *147616* | *SCEG* | *GTC* | *285* |
| *147615* | *Duke* | *GTC* | *465* |
| *147613* | *TVA* | *GTC* | *310* |
| *72133712* | *Duke* | *MEAG* | *50* |

**Table 5.6. Capacity Benefit Margin Modeled (CBM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *Duke* | *310* |
| *Southern* | *TVA* | *400* |
| *Southern* | *EES* | *100* |
| *Southern* | *SCPSA* | *120* |
| *Southern* | *SCEG* | *120* |
| *GTC* | *TVA* | *221* |
| *GTC* | *Duke* | *104* |
| *GTC* | *SCEG* | *47* |
| *GTC* | *SCPSA* | *28* |

For more information on Southern's CBM, click here.
For more information on GTC's CBM, click here.

**Table 5.7. Transmission Reliability Margins Modeled (TRM)**

| Transmission Owner | Interface | Amount (MW) |
|---|---|---|
| *Southern* | *From Duke* | *199.46* |
| *GTC* | *From Duke* | *100.65* |
| *MEAG* | *From Duke* | *26.26* |
| *Dalton* | *From Duke* | *3.53* |
| *Southern* | *From Entergy* | *205.01* |
| *Southern* | *From TVA* | *233.43* |
| *GTC* | *From TVA* | *48.57* |
| *MEAG* | *From TVA* | *12.67* |
| *Dalton* | *From TVA* | *1.70* |

For more information on the Southern Balancing Authority's TRM, click here.