TAG Meeting
May 9, 2008

NCEMC Office

Raleigh, NC

TAG Meeting Agenda

1. Introductions and Agenda – Rich Wodyka
2. 2008 Study Activities – Andy Fusco
3. Enhanced Transmission Access Requests – Rich Wodyka
4. 2007 Supplemental Report – Mark Byrd
5. NCTPC Stakeholder Data Access – Bob Pierce and Rich Wodyka
6. Regional Studies – Bob Pierce
7. TAG Work Plan – Rich Wodyka
8. TAG Open Forum – Rich Wodyka

NCTPC 2008 Study Activities

Andy Fusco
ElectriCities

Purpose of Study

- **Assess Duke and Progress transmission systems' reliability and develop a single Collaborative Transmission Plan**
- **Also assess Enhanced Access Study requests provided by Participants or TAG members**

Steps and Status of the Study Process

Completed

1. Assumptions Selected
2. Study Criteria Established
3. Study Methodologies Selected
4. Models and Cases Developed
5. Technical Analysis Performed
6. Problems Identified and Solutions Developed
7. Collaborative Plan Projects Selected
8. Study Report Prepared

Study Assumptions Selected

- **Study Year – near term reliability analysis:**
  - **2013 Summer**
- **Study Year – longer term reliability analysis:**
  - **2018 Summer**
- **LSEs provided:**
  - **Input for load forecasts and resource supply assumptions**
  - **Dispatch order for their resources**
- **Interchange coordinated between Participants and neighboring systems**

Study Criteria Established

- **NERC Reliability Standards**
  - Current standards for base study screening
  - PWG to select subset of proposed TPL Standard revisions for sensitivity analyses
- **SERC Requirements**
- **Individual company criteria**

Study Methodologies Selected

- **Similarities to previous studies:**
  - **Thermal Power Flow Analysis**
  - **Voltage, stability, short circuit, phase angle analysis - as needed**
- **Modifications to examine Duke and Progress transmission planning differences**

Methodology Cont'd:
Transmission System Planning Review

Participants:

- **Reviewed similarities and differences in Duke and Progress planning practices**
- **Agreed to proceed with 2008 study using current practices to develop base case**
- **Incorporated evaluation of several key differences in methodology for 2008 study scope**

Methodology Cont'd: Key Differences to Examine

- **Common Tower Outages**
  - Driven by proposed changes to NERC TPL Standards
  - PWG: Model as contingency on both systems
- **TRM Methodology**
  - Progress Operations - plans for new methodology in 2008
  - PWG: Once developed, conduct sensitivity analysis to compare to current TRM assumptions
- **Transformer Rating Assumptions**
  - Progress - study of transformer rating assumptions in 2008
  - PWG: Based on results, may incorporate as sensitivity analysis

Base Case Models Developed

- Latest available SERC LTSG cases were selected and updated for study years
- Combined detailed model for Duke and Progress was prepared
- Planned transmission additions from updated 2007 Plan/2007 Supplemental Plan were included in models

Resource Supply Cases Selected

- **Large baseload resources in Progress and Duke areas**
  - **Rely on existing studies, if available, or develop scenarios**
- **Renewable Wind Scenarios**
  - **250 MW along North Carolina coast**
  - **500 MW in North Carolina mountains**

Summary of Study Scope

Sensitivities on Base	Alternative Scenarios
• TRM Methodology • Transformer Ratings Assumptions (as appropriate) • Subset of TPL Standards	• Resource Supply Options ➢ Large baseload generation - Progress area - Duke area ➢ Wind generation - coast - mountains • Enhanced Access Requests

Technical Analysis

- Conduct thermal screenings of the 2013 and 2018 base cases
- Conduct sensitivity analyses on 2018 base case
- Develop and screen the 2018 Resource Supply Option cases
- Develop and screen any 2018 Enhanced Access Study Requests

Problems Identified and Solutions Developed

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

Collaborative Plan Projects Selected

- Compare all alternatives and select preferred solutions

Study Report Prepared

- Prepare draft report and distribute to TAG for review and comment

Questions ?

Enhanced Transmission Access Requests

Rich Wodyka - ITP

Enhanced Transmission Access Requests

- **TAG memo distributed on February 13th requesting input**
- **Deadline for input was February 27th**

- ***No requests were received***

Report on the 2007 Supplemental Study

Mark Byrd

Progress Energy

Supplemental Report Outline

- Richmond-Ft Bragg Woodruff St 230 kV Line
- Jacksonville 230 kV Substation Static VAR Compensator
- Progress West Area Import Analysis
- Updated 2007 Collaborative Transmission Plan
- Comparison to Prior Collaborative Plans

Richmond-Fort Bragg Woodruff Street 230 kV Line

- OATT request for 643 MW of generation on 230 kV bus of the Richmond 500 kV Substation
- PEC Facilities Study Report on October 25, 2007
- OATT studies identified the need for a new Richmond-Fort Bragg Woodruff Street 230 kV Line
- OATT studies are posted on the Progress OASIS
- PWG reviewed and confirmed study results
- Planned ISD is June 1, 2011 and the estimated cost is $85 million

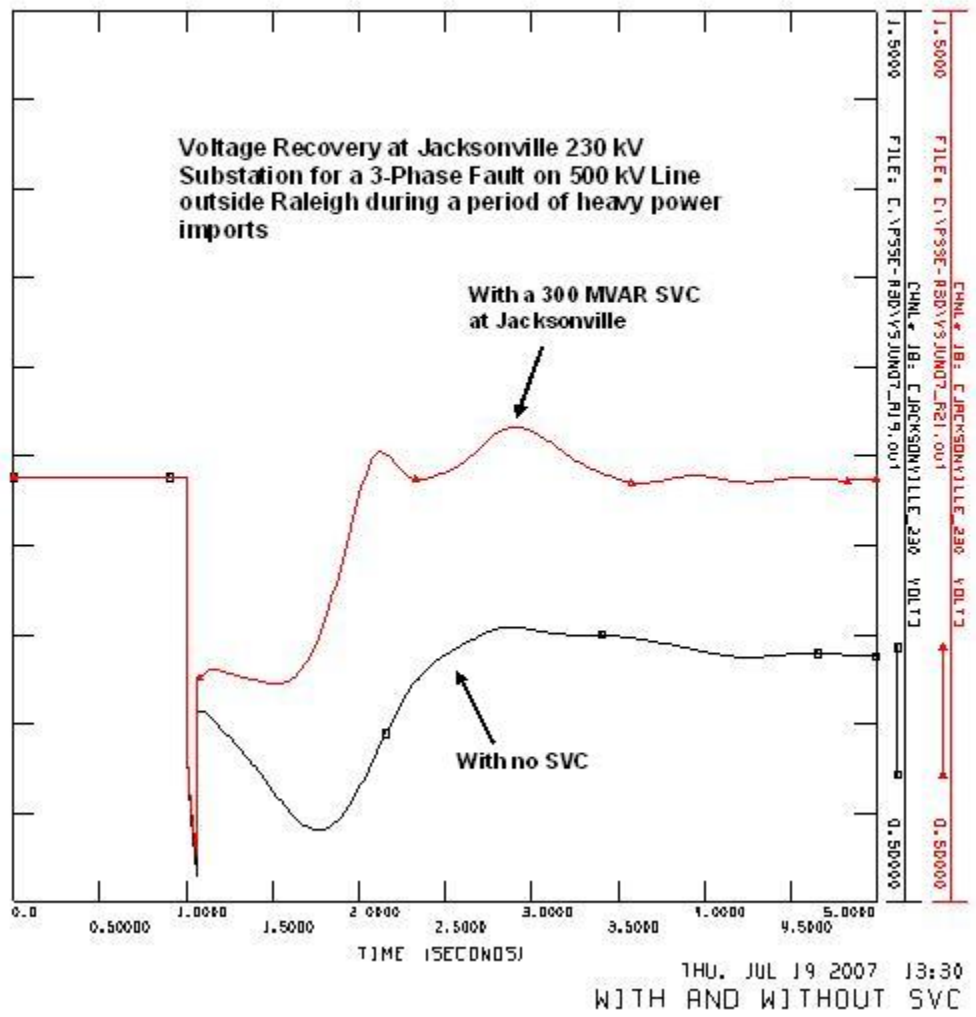
Impact on the 1,200 MW Import Resource Supply Option

- The 2007 Plan, released in Jan '08, included analysis of 1,200 MW import
- PEC OATT study included 1,200 MW of additional imports from Duke to Progress East
- Results indicated no thermal overloads with new generation and proposed transmission line
- No adverse impact on 1,200 MW additional import

Jacksonville 230 kV Substation Static VAR Compensator (SVC)

- OATT request received for 600 MW import from Duke to Progress East starting in 2012
- PEC Facilities Study report in July 2007
- Results indicated depressed voltage and prolonged recovery in Progress East
- Detailed motor load model was used
- 300 MVAR SVC at Jacksonville 230 kV Substation provides dynamic reactive support to allow voltage to quickly recover
- Planned ISD is June 1, 2012 and the estimated cost is $30 million

Jacksonville SVC



Progress West Area Import Scenarios

- Beginning in 2010, potential changes in Progress East to West transfers across Duke and imports from Duke to Progress West were submitted on the Duke and Progress OASIS
- Potential shift from PJM as the source area in 2009 time frame to Duke and CPLE as the source areas in later years

Progress West Area Import Scenarios

Proposed Sources to Supply Progress West Area Load

Year	PJM (AEP)	TVA	CPLE	Duke	SOCO	Total
2008	250	1	136			387
2009	250	1	136	45		432
2010		1	300	295		596
2011		1	300	195	100	596
2012-2014		1	300	195		496
2015-2019		1	400	195		596

Progress West Area Import Analysis

- PWG assessed the requests for serving Progress West load and identified transmission loading issues
- PWG developed and evaluated transmission alternatives for resolving the overloads
- Studies were performed using 2011/12 and 2015/16 winter and 2016 summer power flow models

Transmission Alternatives Evaluated

- Analysis indicated need for a number of upgrades
- Upgrades to Duke's Shiloh - Pisgah 230 kV Line, N. Greenville - Pisgah 100 kV Line, Peach Valley - Riverview 230 kV Line and the jointly owned Pisgah (Duke) - Asheville (PEC) 230 kV Line were identified
- Analysis also addressed common tower outages
- Five alternatives to "reconductoring" option were developed and evaluated

Summary of Results and Next Steps

- All alternatives meet NERC reliability criteria
- Some of these have greater benefits than others
- Some of these have higher public and environmental impact than others
- Duke and Progress will continue evaluating the more promising alternatives
- Duke and Progress will keep NCTPC apprised of the status of the evaluation

Updated 2007 Collaborative Transmission Plan

- Two new projects were added to the Collaborative Transmission Plan
- Detailed descriptions of these two projects were provided
- Cost estimates for several of the projects in the Plan were updated
- Updated Plan includes 18 projects with an estimated cost of $10 million or more each

Comparison to Prior Collaborative Transmission Plans

- **Appendix C of Supplemental Report provides a detailed comparison of the NCTPC Plans to date**

	2006 Plan	2006 Supplemental Plan	2007 Plan	2007 Supplemental Plan
Number of projects with an estimated cost of $10 million or more each	16	14	17	18
Total estimated cost of Plan	$403 M	$294 M	$400 M	$523 M
Planning horizon	2006-2016	2006-2016	2007-2017	2007-2017
Date Plan published	01/25/07	04/26/07	01/16/08	TBD

Questions ?

NCTPC Stakeholder Data and Information Access

Bob Pierce - Duke Energy

Rich Wodyka - ITP

NCTPC Data Request Overview

NCTPC study data and related information that will be made available upon request to TAG Voting Members, subject to the NCTPC process to obtain data and to CEII and confidentiality restrictions:

- **Base case data files for the near- and long-term study years**
- **Sufficient information to replicate the results of planning studies**

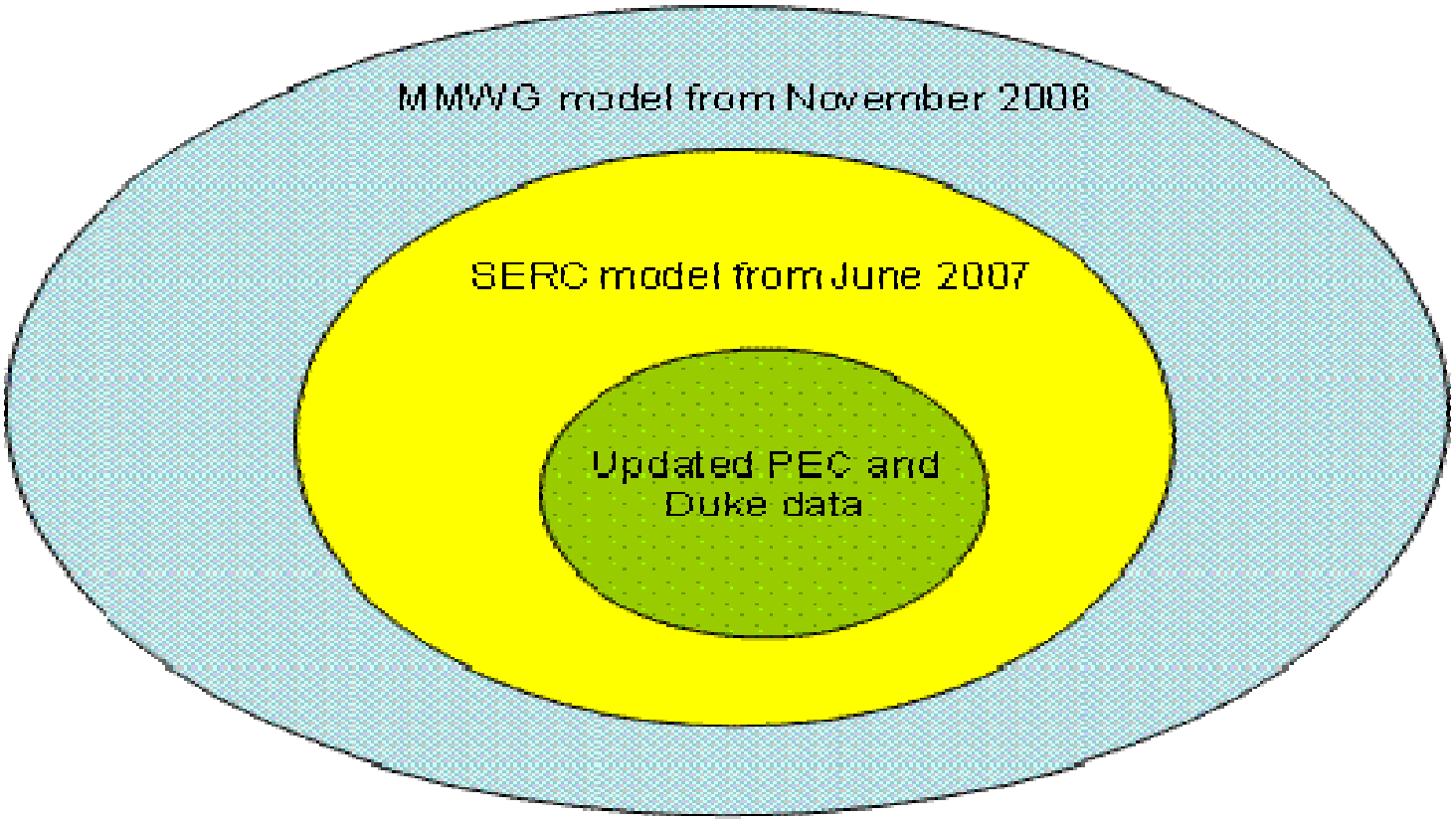
Process to Obtain NCTPC Modeling Data

- **Must be a TAG Voting Member**
- **Must sign the TAG Voting Member Confidentiality Agreement**
- **Must formally request data from the ITP and demonstrate that he/she has:**
  - **Been authorized by FERC to receive CEII-protected version of Form 715 for both Duke & Progress**
  - **Is a representative of a TAG Voting Member that has signed the SERC Confidentiality Agreement**
  - **Signed Attachment A to the TAG Voting Member Confidentiality Agreement**

Data Available

- Models (customer confidentiality maintained)
- Dispatch files (only the format will be provided)
- Contingency files (list of transmission facilities outaged)
- Monitor files (causes capture of Duke/PEC area data from models and sets limits for reporting voltage or loading violations)
- Subsystem files (defines the Duke/PEC area in the model)
- Idevs for update model (macros that add any new facilities to the model)
- Interchange table (shows base case interchange between control areas)

Model Overview



Dispatch Format

Bus	Unit	MW	Priority	Heat Rate	Name
1199	1	863	X	X	Oconee 1
1200	3	863	X	X	Oconee 3
1210	2	863	X	X	Oconee 2
2229	2	1145	X	X	McGuire 2
2228	1	1145	X	X	McGuire 1
1857	2	566	X	X	Cliffside 5

TAG Process for Access to Regional Study Information

- **Must be a TAG Member**
- **Must sign the TAG Member Confidentiality Agreement**
- **Must demonstrate that he/she has:**
  - **Been authorized by FERC to receive CEII-protected version of Form 715 for both Duke & Progress**
- **Will be verified prior to TAG meeting presentations on regional studies**

Questions ?

Regional Studies Reports

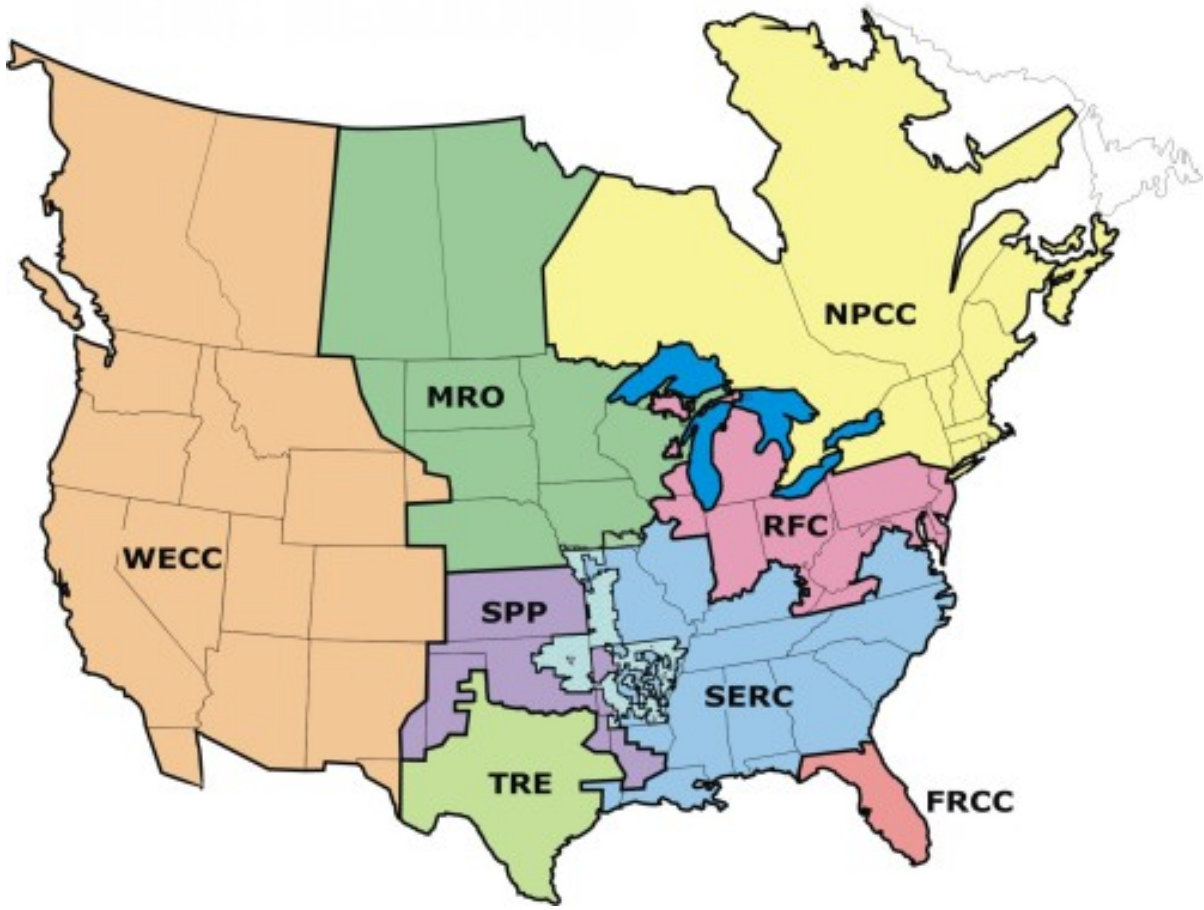
Bob Pierce – Duke Energy

SERC Transmission Assessment Study Processes

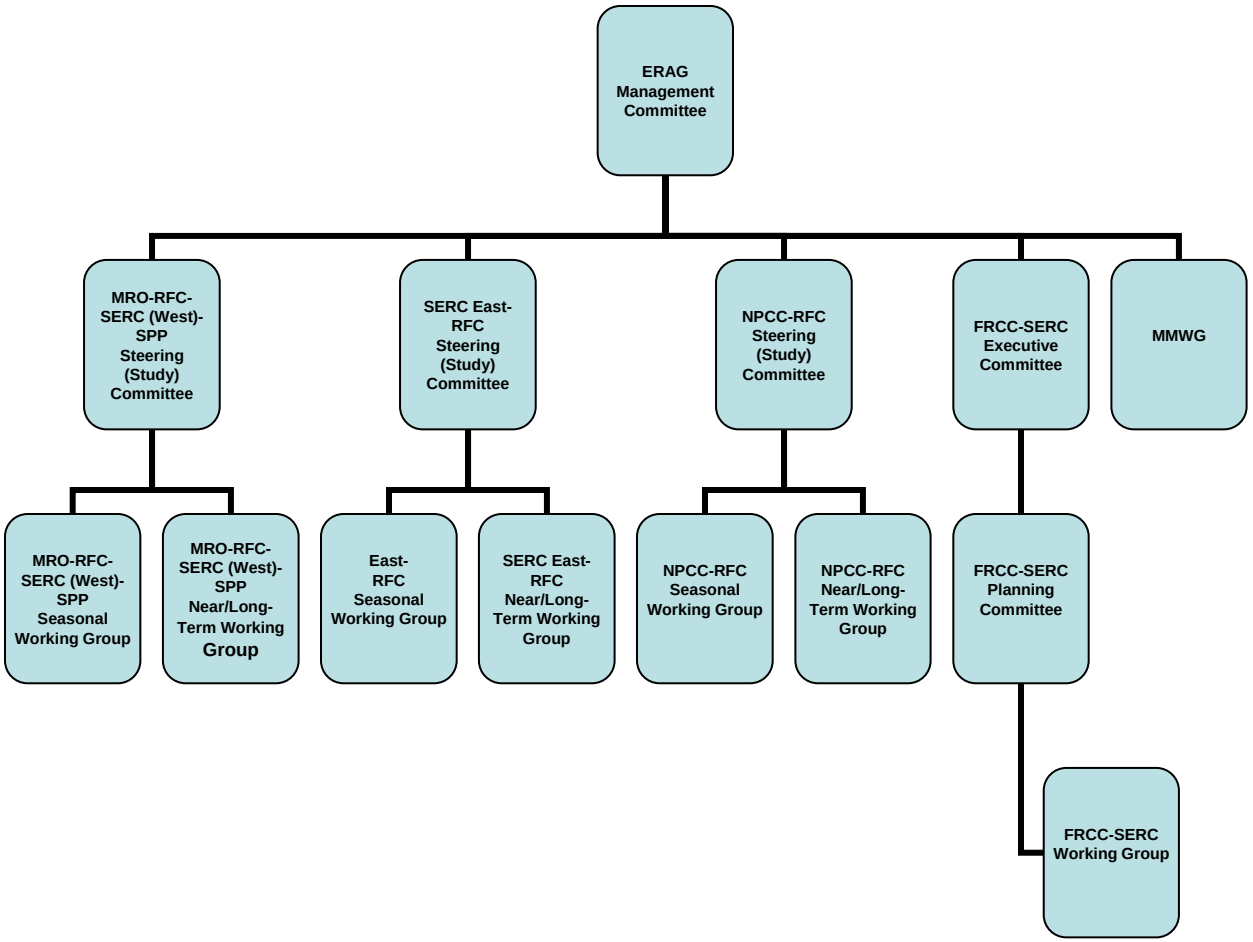
Objectives

- Provide an overview of model development and study processes
- Review fictitious SERC study results and develop understanding of the study content

Eastern-Interconnection Reliability Assessment Group (ERAG)



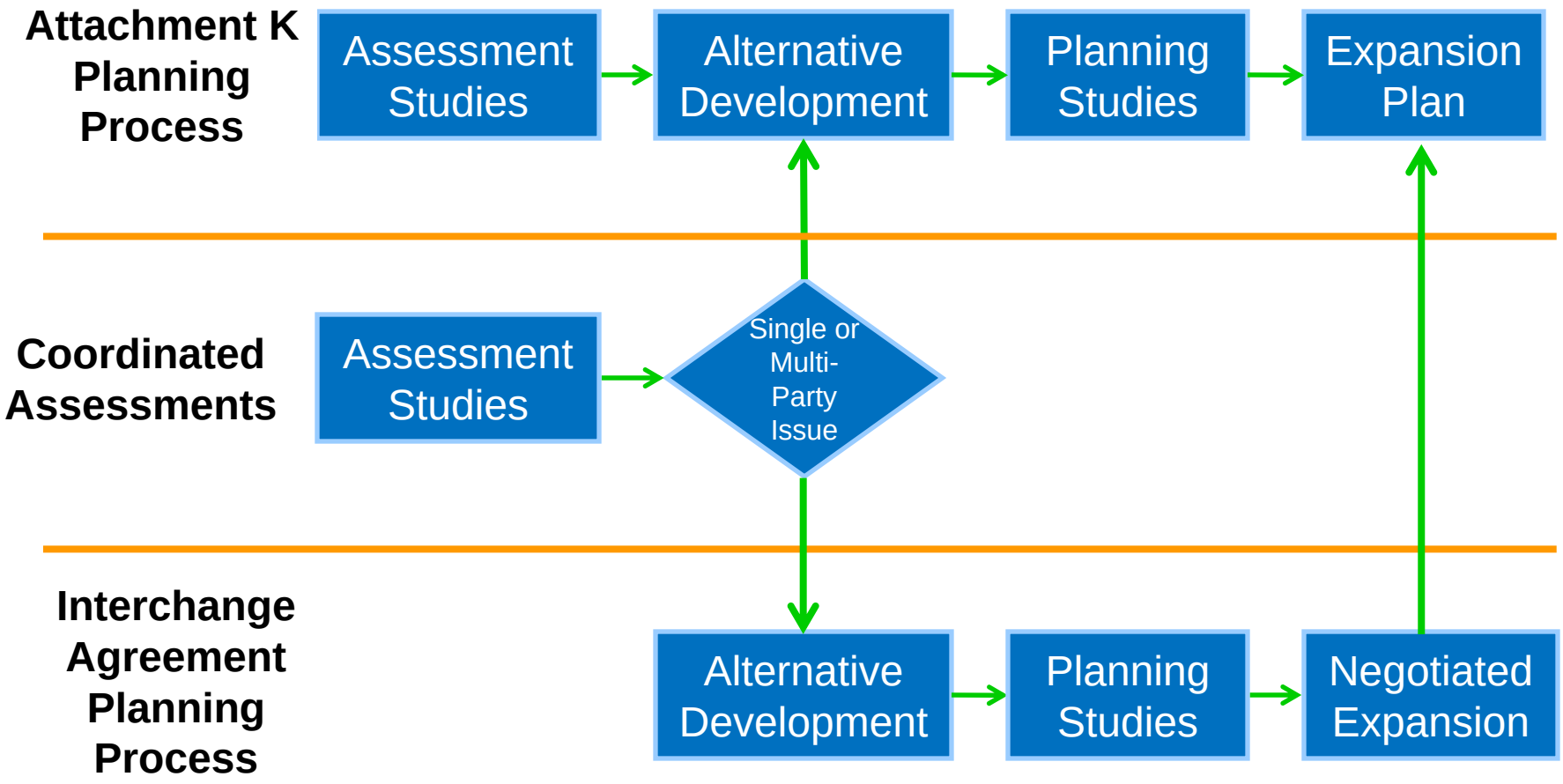
Eastern-Interconnection Reliability Assessment Group (ERAG)



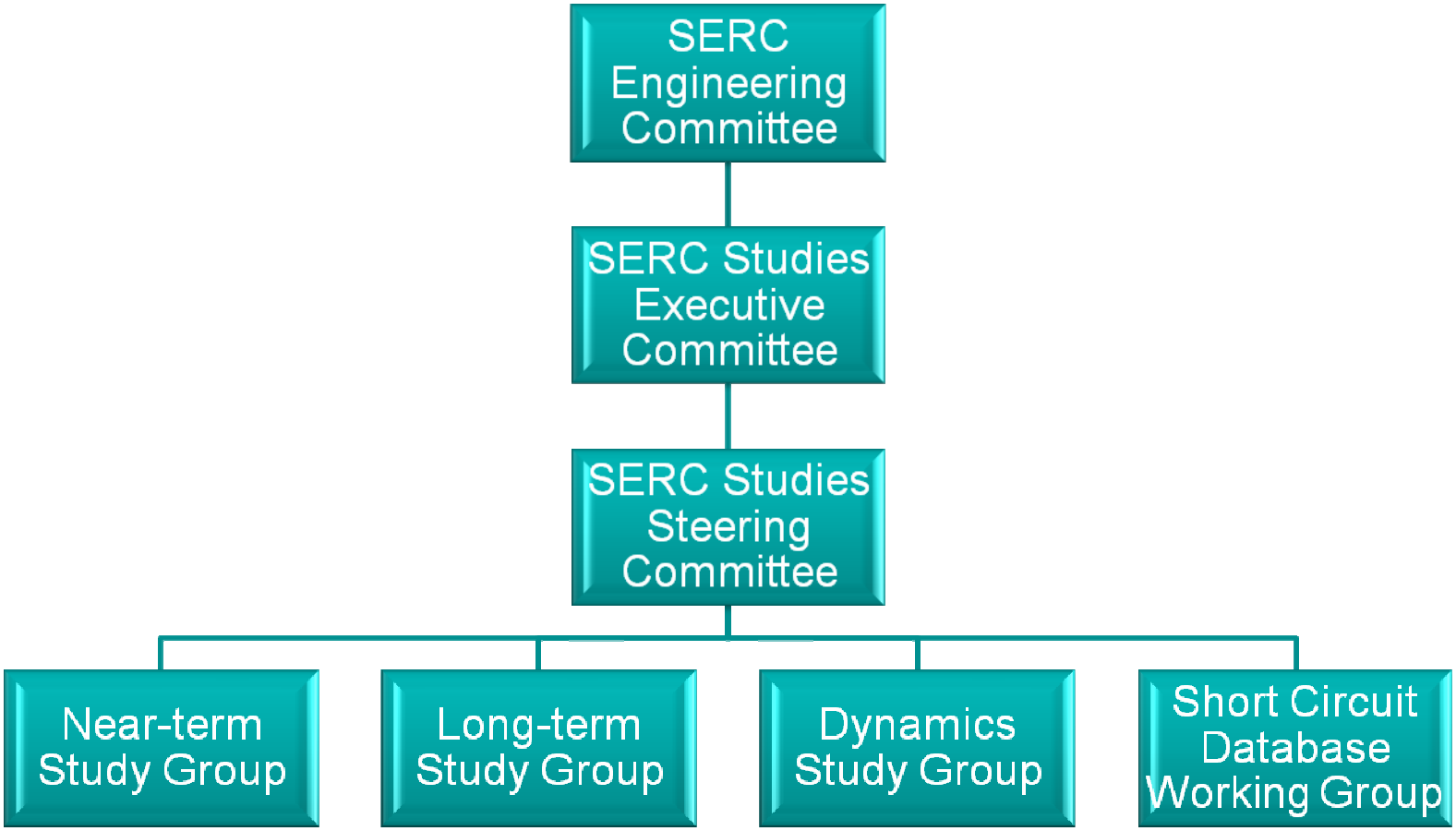
Eastern-Interconnection Reliability Assessment Group (ERAG)

- Conducts Summer and Winter Reliability Studies
- Conducts Future Year Reliability Studies
- Results used by Transmission Operators, Reliability Coordinators and Transmission Planners

Reliability Planning Studies



SERC Study Processes



Study Purpose

- **Augment the reliability of each participant's bulk power system**
- **Supplement Local and Regional Planning Processes**
- **Improve coordination of the planning of the bulk electric system**
- **Assist in determining if planned systems are simultaneously feasible**

SERC NTSG (Near-term Study Group)

- **Conducts Summer and Winter Reliability Studies**
- **Uses latest information on expected system conditions**
  - **Scheduled generator outages**
  - **Scheduled transmission outages**
  - **System configuration**
    - **Project delays**
    - **Project scope changes**

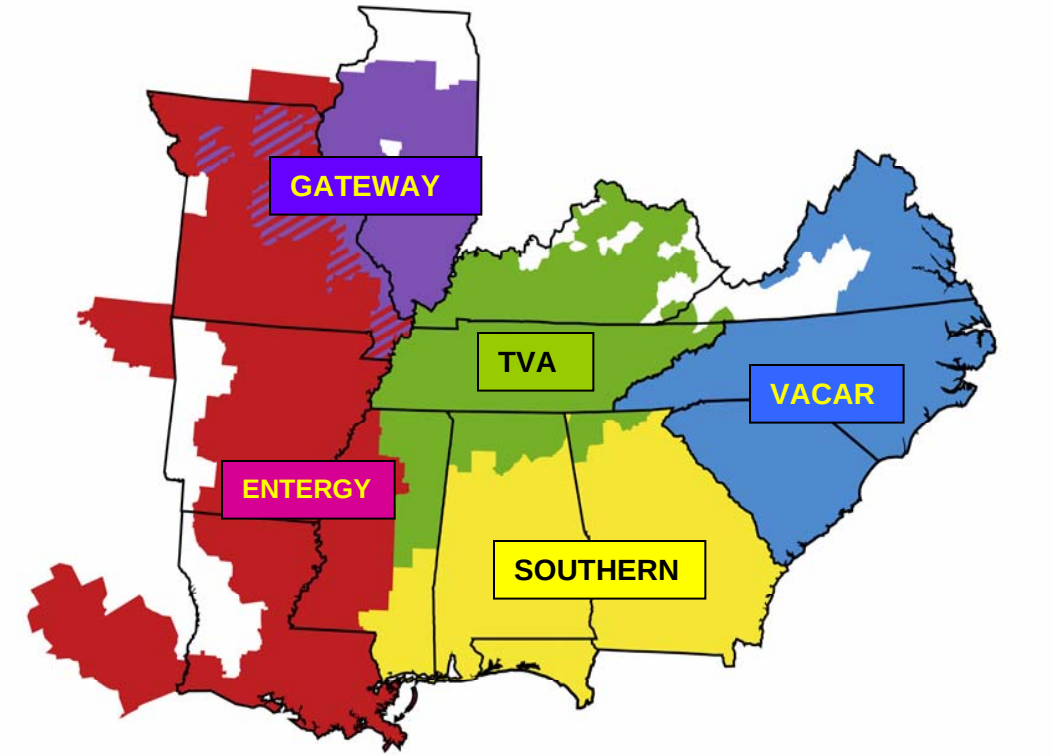
SERC NTSG
(Near-term Study Group)

- Conducts reliability transfer capability analyses
- Identifies conditions that constrain transfers
- Analyzes proposed and approved Operating Procedures to mitigate constraints
- Results used by Transmission Operators and Reliability Coordinators

SERC LTSG (Long-term Study Group)

- Maintains power flow models
- Conducts Future Year Reliability Studies
  - Major transmission and generation additions
- Uses latest information on expected system improvements
- Conducts reliability transfer capability analyses
- Conducts NERC Table 1 testing
- Results used by Transmission Planners

VACAR-SOUTHERN-TVA-ENTERGY-GATEWAY Study Group 2015 Summer Future Year Study



VACAR

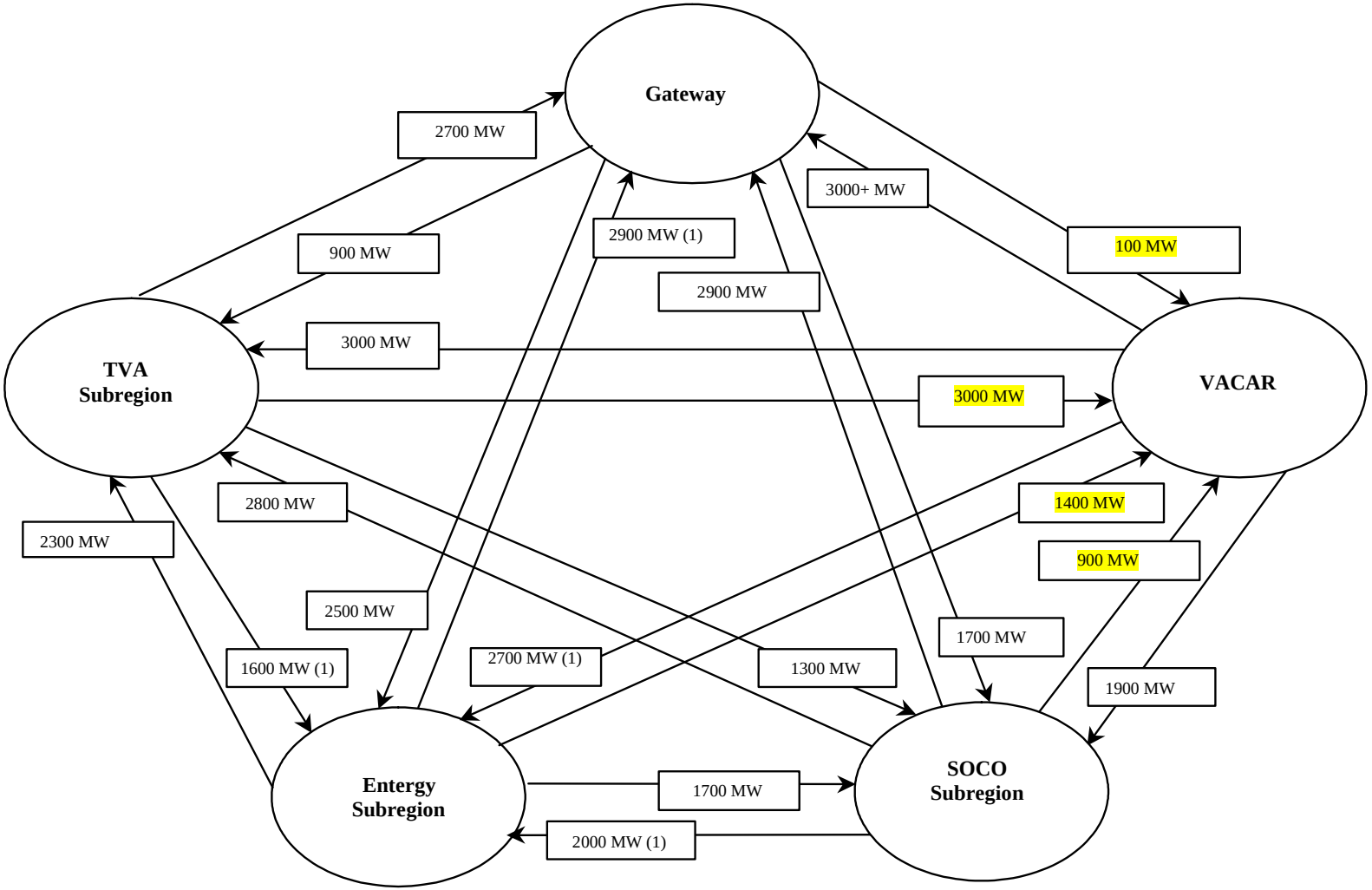
- **Under assumed study conditions for the projected 2015 summer peak, VACAR import capabilities from the Southern, TVA, Entergy, and Gateway subregions were assessed at a test level of 3000 MW. For these evaluations, import generation dispatch participation is distributed among the five VACAR systems as outlined in the following table.**

	% Import Participation	MW Participation
CP&L	22	660
DUKE	35	1050
SCEG	9	270
SCPSA	6	180
DVP	28	840
TOTAL	100	3000

VACAR Subregion Results

- There are no NITC limits for VACAR imports from any of the other SERC subregions below the 3000 MW test level.
- Facilities that could limit transfers to VACAR are as follows:
  - Pleasant Garden 500/230 kV (DUKE)
  - Nantahala-Fontana 161 kV (TVA/DUKE)
  - McIntosh Tap-Callawassie 115 kV (SCEG)
  - Bowen-Conasauga 500 kV (Southern)

Interregional & Subregional Summary of Incremental Transfer Capabilities
Firm Contracts & Firm Native Load Reservations
VSTE 2015 Summer Future Year Study - Diagram 1



Duke Energy Carolinas

Duke Import Capability

NITC levels for all transfers tested meet or exceed test levels. The DK1 (Wateree-Great Falls 100 kV line) Operating Guide must be invoked to meet the test level for imports from Southern. NITC is considered to be satisfactory for the 2015 summer study period.

DUKE import FCITC from:

CP&LE	not limited by any facility up to the level tested. The DK1 (Wateree-Great Falls 100 kV line) Operating Guide must be invoked at 900 MW to meet the test level. The test level for CP&LE is 2000 MW.
SCEG	limited to 1200 MW by SCPSA's Pee Dee-Marion 230 kV line for an outage of SCEG/DUKE's Parr-Bush River 230 kV line.
SCPSA	not limited by any facility up to the level tested. The test level for SCPSA is 2000 MW.
DVP	not limited by any facility up to the level tested. The test level for DVP is 2000 MW.
SOCO	limited to 2200 MW by loading of Duke's Eno-Pleasant Garden 230 kV line for an outage of the parallel 230 kV Line.
GTC	not limited by any facility up to the level tested. The test level for GTC is 2000 MW.
TVA	limited to 1000 MW by loading of the Duke/TVA Nantahala-Fontana 161 kV line for an outage of the TVA Conasauga-Mosteller Springs 500 kV line.
Entergy	not limited by any facility up to the level tested. The EN3 (Fairview-Madisonville 230 kV line) Operating Guide must be invoked at 1100 MW to meet the test level.
YADKIN	not limited by any facility up to the level tested. The test level for YADKIN is 200 MW.
Ameren	not limited by any facility up to the level tested. The test level for Ameren is 2000 MW.

Limiting Facilities for Duke Exports

Limiting Facility for DUKE Exports	Owner	Transfer
Antioch 500/230 kV 1 and 2	DUKE	CP&LE/DVP
Ripp-Shelby 230 kV 1/2	DUKE	SCPSA
Glen Raven-Burlington Tap W 100 kV	DUKE	CPLE
Anderson-Toxaway 100 kV 1/2	DUKE	SCEG

Fictitious Example of FCITC Values for VACAR

Table A
INTERREGIONAL AND SUBREGIONAL
Summary of Incremental Transfer Capabilities
VSTE 2015 Summer Future Year Study

Transfer	NITC (MW)	FCITC (MW)		Limiting Facility	Rating (MVA)	TDF (%)	LODF (%)	Outaged Facility	Operating Guide
SOCO Subregion to VACAR	3000 +			No limit found at 3000 MW				None	
		*900		McIntosh-Purrysburg 230 kV	840	7.3	72.0	Antioch 500/230 kV 1	
		2100		McIntosh-Jasper 115 kV	240	3.3	18.3	McIntosh-Purrysburg 230 kV	
		2500		Antioch 500/230 kV 1	840	6.9	68.2	Widows Creek-Crawfish Creek 230 kV	
		2600		(SG)Yemassee-Yemassee 230 kV	797	7.2	8.6	Purrysburg-Bluffton 230 kV	
		2800		McIntosh Tap-Callawassie 115 kV	189	3.3	18.3	Pee Dee-Marion 230 kV	
		2900		Antioch 500/230 kV 2	797	4.9	34.0	(SC) Kingstree-Kingstree 230 kV	
		3000	+	No other limit found at 3000 MW				Any other tested facility	
TVA Subregion to VACAR (4)	3000 +			No limit found at 3000 MW				None	
		*1300		Little Gypsy-Fairview 230 kV	840	8.2	72.0	Holden-Clinton 161 kV	
		2100		Widows Creek-Crawfish Creek 230 kV	531	4.2	8.8	Marion CT Plant-Renshaw 161 kV	
		2400		Antioch 500/230 kV 1	840	7.8	68.2	(SG)Yemassee-Yemassee 230 kV	
		3000	+	No other limit found at 3000 MW				Any other tested facility	
Entergy Subregion to VACAR (4)	3000 +			No limit found at 3000 MW				None	
		*1200		McIntosh-Jasper 115 kV	840	8.4	72.0	Little Gypsy-Fairview 230 kV	
		2000		Antioch 500/230 kV 1	840	8.0	68.2	Little Gypsy-Fairview 230 kV	
		2100	(1)	33-Marshall 161 kV	454	4.3	36.8	Michoud-Front Street 230 kV	EN3
		2500	(1)	Holden-Pittsville 161 kV	227	9.0	82.9	Holden-Clinton 161 kV	
		2900	(1)	Holden-Clinton 161 kV	227	8.5	73.2	Holden-Pittsville 161 kV	AI4
		2900	(1)	Little Gypsy-Fairview 230 kV	454	3.9	13.1	McKnight-Franklin 500 kV	EN3
		3000	+	No other limit found at 3000 MW				Any other tested facility	
Gateway to VACAR	3000 +			No limit found at 3000 MW				None	
		*1200		Shawnee-Marshall 500 kV	840	9.4	72.0	Antioch 500/230 kV 1	
		1600		Antioch 500/230 kV 1	840	8.9	68.2	Antioch 500/230 kV 2	
		2100		McKnight-Franklin 500 kV	203	3.0	4.4	Shawnee-Marshall 500 kV	
		3000	+	No other limit found at 3000 MW				Any other tested facility	

Notes: * Identified limit for this transfer

(1) Operating guide identified
(2) Operating guide in effect
(3) An operating guide is in effect; another operating procedure is identified
(4) Denotes exporting area has reduced load

Notes: (A) FCITC limits are generally reported a maximum of 3 times for the same limiting facility

(B) FCITC limits are not reported for limiting facilities with a TDF of less than 3%.
(C) Outaged facilities in parenthesis indicate an operating guide in effect.
(D) Available operating guide descriptions with corresponding identifier are provided.

Duke AC & ACCC Results

- **ACCC analysis of 2015 summer operating conditions identified various facilities in the Duke system that will overload under single contingency outages. The overloads are slight and far enough in the future that continued monitoring would determine when action is warranted. All of the overloads can be alleviated through minor ancillary equipment upgrades. None of the problems identified impact the operation of neighboring systems.**
- **No voltage violations were identified on load buses by the AC & ACCC analysis. There are no voltage concerns affecting reliability in the Duke Control Area.**

What the AC & ACCC Results Mean

- The base model represents how SERC native load will be served in summer of 2015 (with no additional transfers superimposed).
- The AC & ACCC analysis assists in determining if the planned systems are simultaneously feasible.
- The 2015 summer study did not identify any reliability concerns in the Duke area.

Summary

- Provided an overview of the ERAG and SERC model development & study processes.
- Reviewed an example of SERC study results and provided an explanation of the study content & what meaning can be derived from the studies.

Questions ?

2008 TAG Work Plan Review

Rich Wodyka - ITP

2008 TAG Work Plan

January

- **2007 STUDY REPORT**
  - ✓ **Receive final 2007 Study Report**

February

- **2008 STUDY SCOPE**
  - ✓ **Receive 2008 Study Scope for comment**
  - ✓ **Review and provide comments to the OSC on the 2008 Study Scope including the Study Assumptions; Study Criteria; Study Methodology and Case Development**
  - ✓ **Receive request from OSC to provide input on proposed Enhanced Transmission Access scenarios and interfaces for study**
  - ✓ **Provide input to the OSC by 2/27 on proposed Enhanced Transmission Access scenarios and interfaces for study**

April - May

- **2007 SUPPLEMENTAL REPORT**
  - ✓ **Receive the 2007 Supplemental Report**

TAG Meeting

- ➢ **Receive a progress report on the 2008 Planning study activities and results**
- ➢ **Receive feedback from the OSC on what proposed Enhanced Transmission Access scenarios and interfaces will be included in the 2008 study**
- ➢ **Receive presentation on the 2007 Supplemental Report and provide comments to OSC**

- **2007 SUPPLEMENTAL REPORT**
  - ➢ **Provide comments on the 2007 Supplemental Report**
  - ➢ **Receive final 2007 Supplemental Report**

June - July

TAG Meeting

- **2008 TECHNICAL ANALYSIS, PROBLEM IDENTIFICATION and SOLUTION DEVELOPMENT**
  - **TAG will receive a progress report from the PWG on the 2008 study**
  - **TAG will be requested to provide input to the OSC and PWG on the technical analysis performed, the problems identified as well as proposing alternative solutions to the problems identified**
  - **Receive update status of the upgrades in the 2007 Collaborative Plan**
  - **TAG will be requested to provide input to the OSC and PWG on any proposed alternative solutions to the problems identified through the technical analysis**

August - September

TAG Meeting

- **2008 STUDY UPDATE**
  - **Receive a progress report on the Reliability Planning and Enhanced Transmission Access Planning studies**
- **2008 SELECTION OF SOLUTIONS**
  - **TAG will receive feedback from the OSC on any alternative solutions that were proposed by TAG members**

December

2008 STUDY REPORT

- Receive and comment on final draft of the 2008 Collaborative Transmission Plan report

TAG Meeting

- Receive presentation on the draft report of 2008 Collaborative Transmission Plan
- Provide feedback to the OSC on the 2008 NCTPC Process
- Review and comment on the 2009 TAG Activity Schedule

Questions ?

TAG
Open Forum Discussion

Comments or Questions ?