Transmission Advisory Group Meeting

January 25, 2007

Raleigh, NC

TAG Meeting Agenda
January 25, 2007

1. Administrative Items
2. 2006 NCTPC Transmission Plan Report
3. 2007 NCTPC Study Scope
4. 2007 Enhanced Access Planning Process
5. 2007 TAG Activity Schedule
6. TAG Open Forum

Report on the NCTPC 2006 Collaborative Transmission Plan

Mark Byrd, Manager – Transmission Planning
Progress Energy Carolinas, Inc

January 25, 2007

2006 North Carolina Transmission Planning Collaborative Report

- Overview of the Report
- Reliability Planning Results
  - Base Reliability
  - Resource Supply Options
- Collaborative Transmission Plan

Overview of the Report

I. Executive Summary
II. North Carolina Transmission Planning Collaborative Process
III. 2006 Reliability Planning Study Scope & Methodology
IV. Reliability Study Results
V. Reliability Study (Summary)
VI. Collaborative Transmission Plan
VII. Conclusions

Organizational Structure

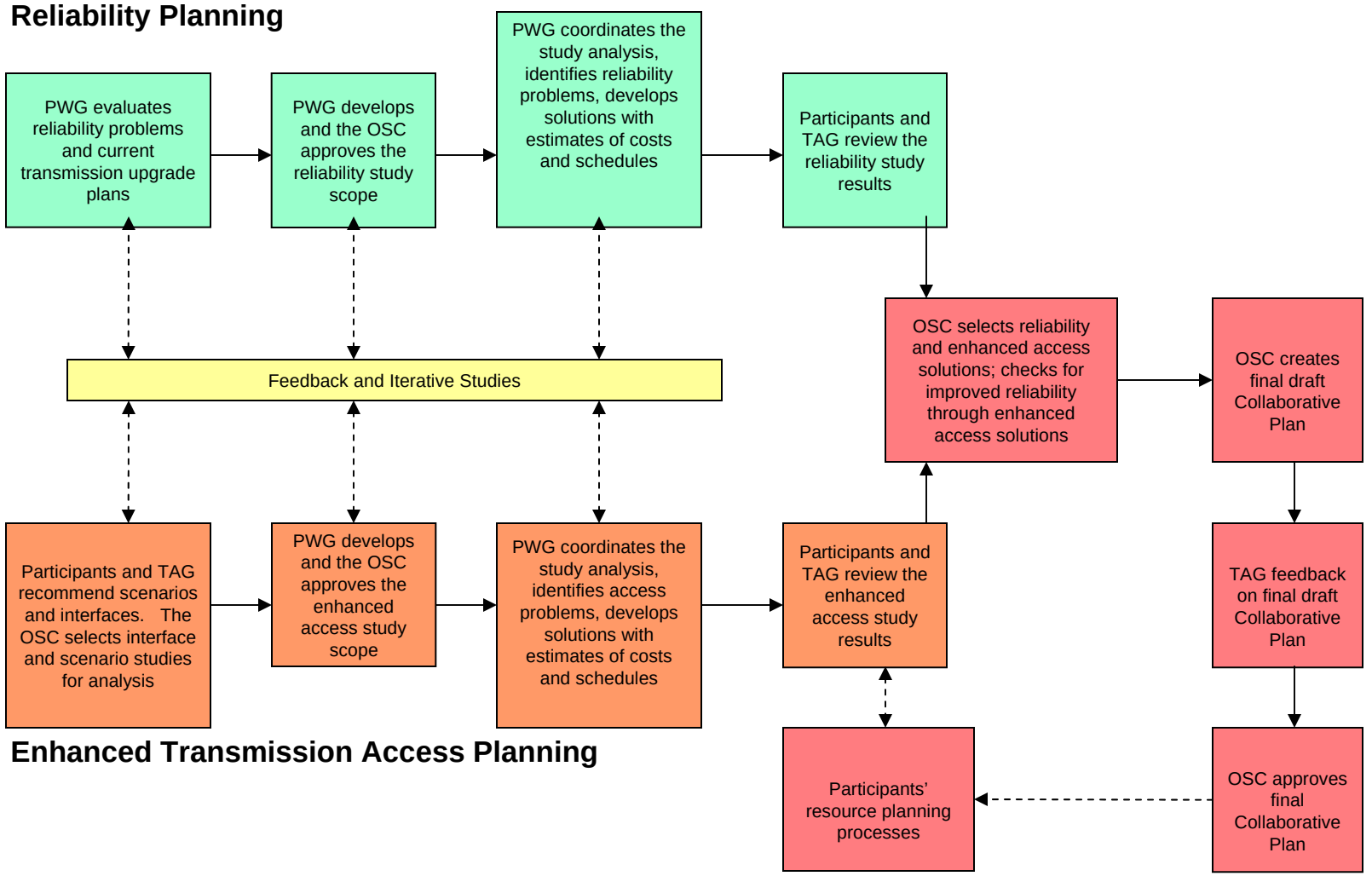
- Oversight / Steering Committee (OSC)
- Planning Working Group (PWG)
- Transmission Advisory Group (TAG)
- Independent Third Party (ITP)

Planning Process

Participants jointly:

- Establish assumptions, criteria, and study methodologies
- Perform studies: thermal, voltage, stability, short circuit
- Evaluate results to identify problems and potential solutions
- Perform cost analysis and rough scheduling of solutions
- Select preferred final and alternative plans
- Solicit input from TAG periodically throughout processes

NCTPC Process Flowchart



Key Assumptions

- Study Year and Planning Horizon
  - Used 2011 Summer for Duke – Progress East
  - Used 2010/11 Winter for Duke – Progress West
  - The Plan addresses a 10 year planning horizon through 2016
- Network Modeling
  - Included projected transmission and generation
  - Included Cliffside (Duke), Anson and Richmond (NCEMC), and Wayne Co. (Progress) future generation
- Interchange and Generation Dispatch
  - Each Participant provided resource dispatch order for its Designated Network Resources
  - Transmission Reliability Margin was modeled for Progress import cases

Reliability Planning Study

- The Scope of the Reliability Planning Study included a base reliability analysis as well as analysis of potential resource supply options
- The purpose of the base reliability study was to evaluate the transmission system's ability to meet load growth projected for 2011 through 2016 with the Participants' planned Designated Network Resources
- The purpose of the resource supply analysis was to evaluate transmission system impacts for various resource supply options to meet future native load requirements

Phase Angle Issue on Richmond-Newport 500 kV Tie

- This 500 kV interconnection is approximately 80 miles long and carries large amounts of power during high import conditions
- Closing the line with phase angles greater than 30 degrees creates an unacceptable sudden change of power on the generating units in the electrical vicinity
- PWG brainstormed potential solutions
- Progress hired a consultant to assist in researching available technologies
- Progress has added 500 kV series reactors at Richmond 500 kV Sub to the Plan

Summary of Collaborative Plan

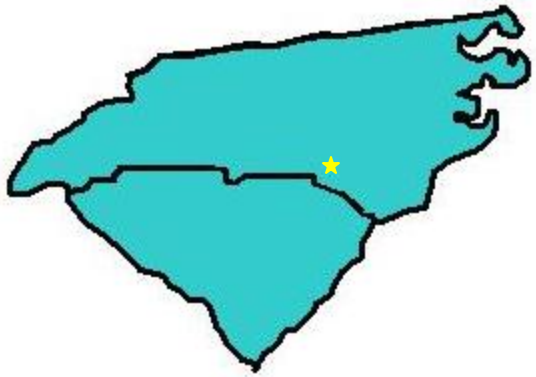
- Comprised of 16 Duke and Progress Projects
- Only projects with projected cost of $10 million or more are listed
- Details listed in Appendices B & C
- List will be updated on an ongoing basis

Major Projects from Base Analysis

- Richmond 500 kV Substation, add 500 kV series reactors
- Durham 500 kV Substation, the Mayo-Wake 500 kV line will be looped in and one new 500/230 kV transformer bank will be installed
- Construct Cape Fear-Siler City 230 kV line
- Rockingham-West End 230 kV line, construct the Wadesboro tap line and the new Rockingham-West End 230 kV East line projects
- Construct Asheville-Enka 230 kV line and install a new 230/115 kV transformer establishing 230 kV at the Enka 115 kV Substation
- Increasing the 500/230 kV transformer capacity at the Antioch Substation
- Bundling of the London Creek (Riverview Switching Station to Peach Valley Tie) 230 kV line

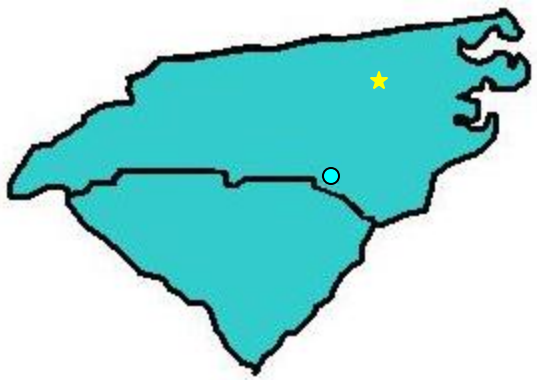
Richmond 500 kV Series Reactor June 1, 2010

- Description
  - Install a 500 kV series reactor at the Richmond 500 kV Substation.
  - Reactor in series with the Richmond-Newport 500 kV line.
- Need
  - To permit closing of the Newport-Richmond 500 kV line at times of high import flow mitigating issues with large post contingency phase angle.
- Cost
  - $15 M



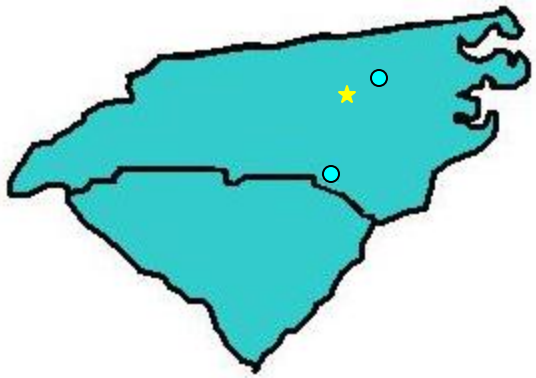
Durham 500 kV Substation — June 1, 2008

- Description
  - Establish 500 kV at the existing Durham 230 kV Substation.
  - Loop in the Mayo-Wake 500 kV line.
  - Install 1-500/230 kV transformer bank.
- Need
  - With a Harris unit down, an outage of either of the Wake 500/230 kV banks at Wake 500 kV Substation will cause the remaining bank to exceed its rating.
- Cost
  - $31 M



Cape-Fear – Siler City 230 kV Line June 1, 2010

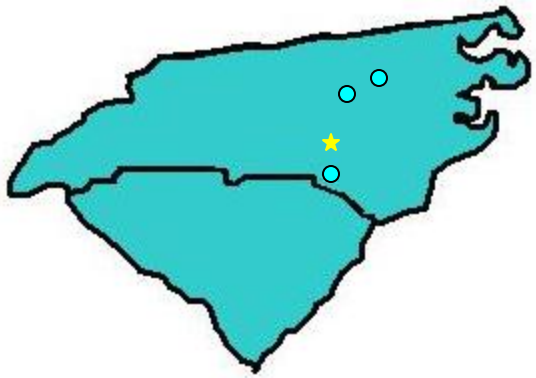
- Description
  - Construct 30 miles of new 230 kV line between Cape Fear 230 kV and Siler City 230 kV Substations.
- Need
  - An outage of the Harris terminal of the Harris-Asheboro 230 kV line will cause unacceptable voltage in the Asheboro/Ramseur/Siler City area.
- Cost
  - $19 M



Rockingham-West End 230 kV Line
Wadesboro Bowman School 230 kV Tap

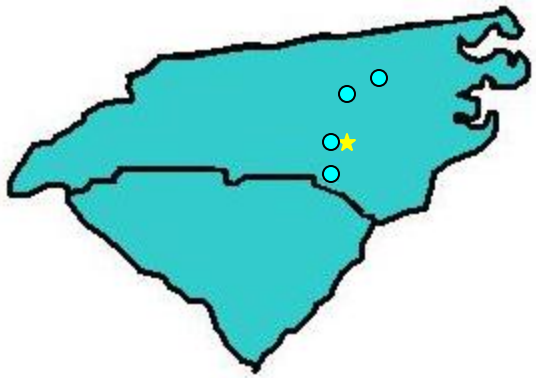
June 1, 2009

- Description
  - Construct 12 miles of new 230 kV to establish a new tap off of the Rockingham-West End 230 kV Line.
  - Service to two 115 kV deliveries to be converted to 230 kV.
  - Uprate a section of the Rockingham-West End 230 kV Line to its full conductor rating between Rockingham and the new tap.
- Need
  - With a Harris unit down, an outage of the Rockingham terminal of the Rockingham-Biscoe 230 kV line will cause the Rockingham-Blewett-Tillery 115 kV corridor to exceed its rating.
- Cost
  - $13 M



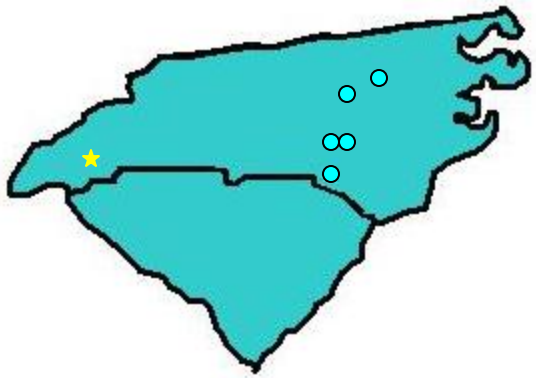
Rockingham–West End 230 kV East Line June 1, 2011

- Description
  - Construct 38 miles of new 230 kV line between Rockingham and West End 230 kV Substations.
- Need
  - With a Harris unit down, an outage of the Richmond-Cumberland 500 kV line will cause the existing Rockingham-West End 230 kV line to exceed its rating.
- Cost
  - $33 M



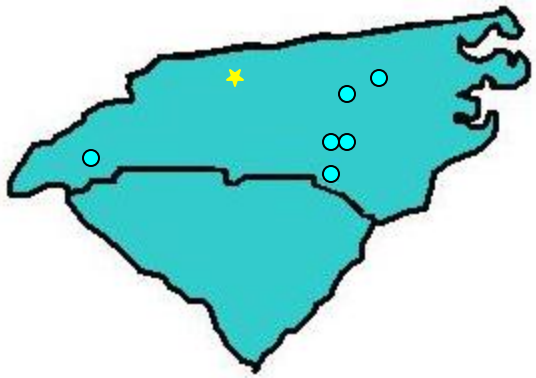
Asheville-Enka 230 kV Line December 1, 2011

- Description
  - Construct 11 miles of new 230 kV line between Asheville 230 kV and Enka 115 kV Substations.
  - Install 1-230/115 kV transformer at Enka.
- Need
  - With an Asheville unit down, an outage of one 230/115 kV transformer at Asheville 230 kV will cause the remaining transformer to exceed its rating.
- Cost
  - $15 M



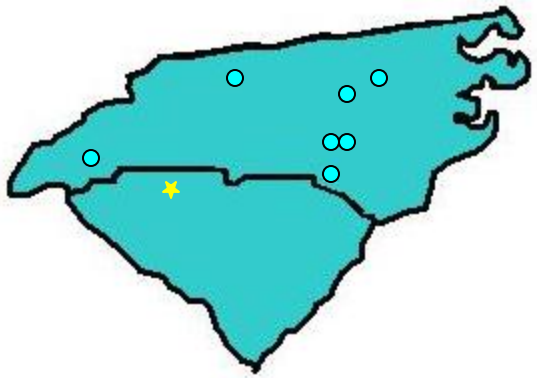
Antioch 500/230 kV Transformer June 1, 2014

- Description
  - Replace the existing 840 MVA 500/230 kV transformers with 1680 MVA transformers.
- Need
  - The Antioch banks will achieve 100% of their present rating (840 MVA) in the 2011-2014 timeframe. Loss of the parallel bank when there is a generation deficiency in Duke's northern region causes the highest loading. North to south transfers into the Duke control area increase bank loading and further decrease import capability.
- Cost
  - $30 M



London Creek 230 kV Line June 1, 2015

- Description
  - Reconductor 20 miles of the existing 795 ACSR conductor with bundled 795 ACSR conductor between Riverview and Peach Valley 230 kV substations.
- Need
  - The London Creek Lines will achieve 100% of their conductor rating in the 2015-2016 timeframe. The lines are most heavily loaded when there is an Oconee unit outage for the loss of the parallel line. The line is sensitive to south to north transfers. Increased import from SOCO lowers loading on the London Creek lines and can delay the need for upgrade.
- Cost
  - $25 M



Resource Supply Option Study Results

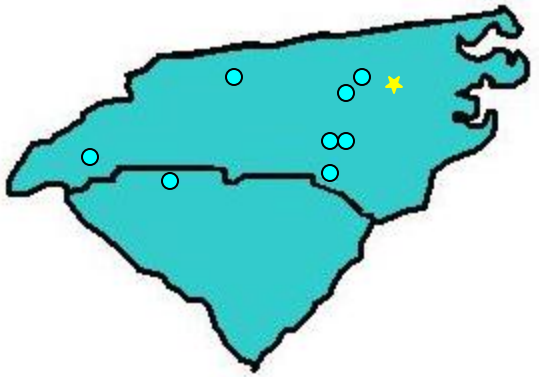
Transfer From	Transfer To	Capacity (MW)	Earliest Resource Supply Option Start Date	Nominal Cost ($M)
PJM (AEP)	Duke	600	2011	3
TVA	Duke	600	2011	2
SOCO	Duke	600	2011	2
SCEG	Duke	600	2011	1
SCPSA	Duke	600	2011	1
CPLE	Duke	600	2011	1
Duke	CPLE	600	2011	130
SCEG	CPLE	600	2011	51
SCPSA	CPLE	600	2011	65
SOCO	CPLE	600	2011	46
TVA	CPLE	600	2011	46
PJM (AEP)	CPLE	600	2011	48
PJM (DVP)	CPLE	600	2011	48
PJM (AEP/AEP)	Duke/CPLE	600/600	2011	79
PJM (AEP/DVP)	Duke/CPLE	600/600	2011	69
PJM (AEP)	CPLW	20	2010/2011	0

Projects Added to Collaborative Plan

- Add a third Wake 500/230 kV transformer
- Construct Buck-Asheboro 230 kV line
- Construct Harris-Durham 230 kV line

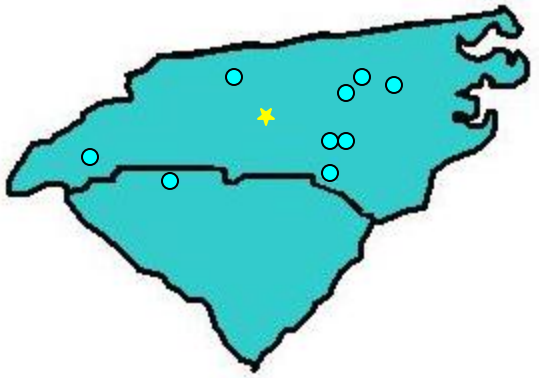
Wake 500/230 kV Bank #3 June 1, 2016

- Description
  - Install a third 500/230 kV 1000 MVA transformer bank at Wake 500 kV Substation.
- Need
  - With a Harris unit down, an outage of one of the existing two Wake 500/230 kV banks causes the remaining bank to exceed its rating.
- Cost
  - $21 M



Buck-Asheboro 230 kV Line June 1, 2014

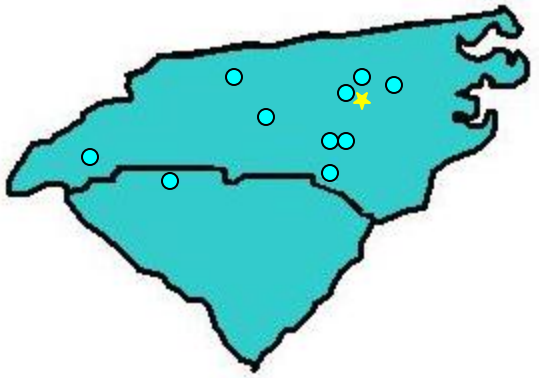
- Description
  - Construct 40 miles of new 230 kV line between Duke's Buck Steam Plant and Progress' Asheboro 230 kV Substation.
- Need
  - Address loadings on Progress' Badin-Tillery-Biscoe-Asheboro 115 kV corridor and Rockingham-Lilesville 230 kV Lines. Also delays Progress' need for Cape Fear-Siler City 230 kV line and Harris-Durham 230 kV line. More comprehensive joint study to be conducted.
- Cost
  - $40 M



Harris-Durham 230 kV Line

June 1, 2016

- Description
  - Conversion of existing 115 kV transmission.
  - Construction of new 230 kV transmission between Harris and Durham 230 kV Substations.
- Need
  - With a Harris unit down, an outage of the common tower Method-East Durham 230 kV line and Method-Durham 230 kV line causes the Cary Regency Park-Durham 230 kV line to exceed its rating.
- Cost
  - $88 M



Benefits of the Process

- Insight into the neighboring system's modeling approaches, including resource assumptions, contingencies evaluated and system dispatch assumptions
- Higher confidence in and understanding of data provided by all Participants, including more detailed and timely information shared
- Improved understanding of the neighboring transmission system, including its strengths and weaknesses and the relationship of impacts between the two transmission systems
- Shared technical and planning expertise that resulted in improved modeling, more comprehensive evaluation of the impact of generation and transmission contingencies, and consideration of more extensive sets of solutions
- More comprehensive approach to developing solutions to address not only reliability, but also to increase access to alternative resource supply options for LSEs

Questions?

NCTPC 2007 Study Scope

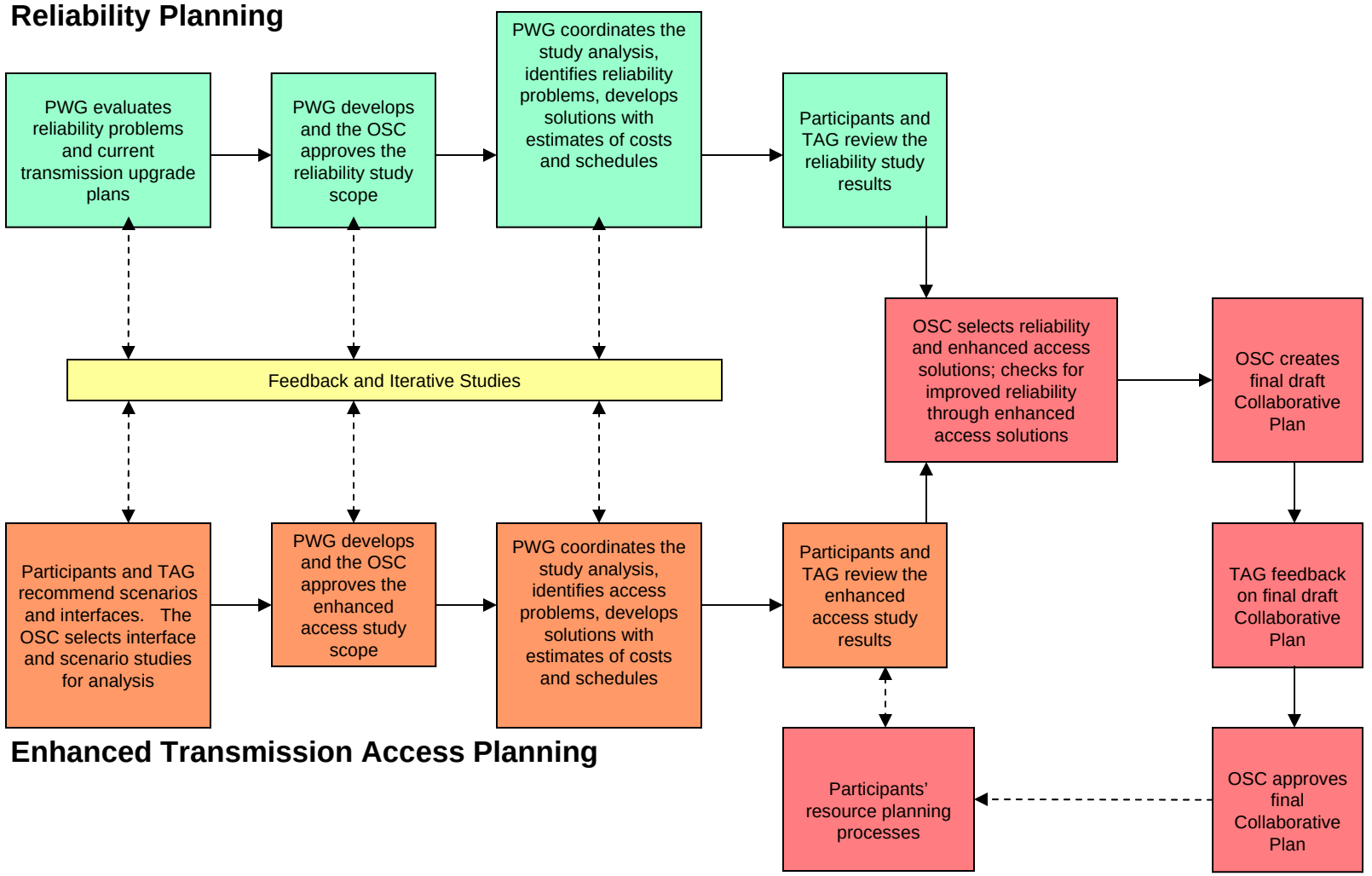
Rich Wodyka

January 25, 2007

Purpose of Study

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

NCTPC Process Flowchart



Transmission System Planning

- **Duke and Progress shared their planning practices and criteria among Participants**
- **PWG identified many similarities and some differences - all comply with NERC reliability standards and SERC requirements**
- **Will continue to evaluate the differences and examine potential common planning practices and criteria that will be used in future studies**

Overview of the Study Process

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

Study Assumptions Selected

- Study Year - 2012 Summer and 2011/2012 Winter for near term reliability analysis
- Study Year - 2016 Summer for longer term reliability analysis
- All LSEs provide input for load forecasts and resource supply assumptions
- Dispatch order for resources provided by LSEs
- Coordinated interchange between Participants and neighboring systems

Study Criteria Established

- **NERC Reliability Standards**
- **SERC Requirements**
- **Individual company criteria**

Models and Cases Developed

- Latest available MMWG or VSTE cases are selected / updated for study years
- Combined detailed model for Duke and Progress is prepared
- Planned transmission additions from 2006 Collaborative Plan are included
- Case scenarios are established

Study Methodologies Selected

- **Thermal Power Flow Analysis**
  - **Duke and Progress Contingencies**
  - **Duke and Progress Monitored Elements**
- **Voltage, stability, short circuit, phase angle analysis is performed as needed**

Technical Analysis Performed

- Assessment of transmission reliability and enhanced access scenarios

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

2007 Overview Schedule

North Carolina Transmission Planning Collaborative

Reliability Planning Process

- Evaluate current reliability problems and transmission upgrade plans
- Perform analysis, identify problems, and develop solutions
- Review Reliability Study Results

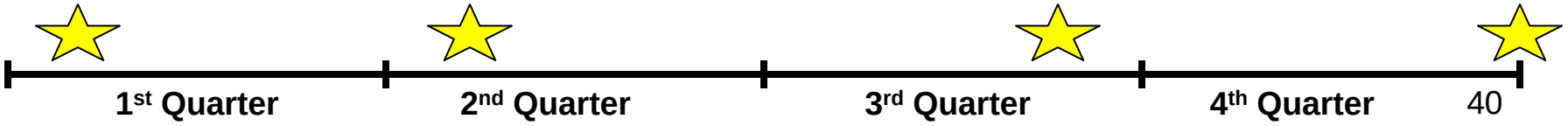
Enhanced Access Planning Process

- Propose and select enhanced access scenarios and interface
- Perform analysis, identify problems, and develop solutions
- Review Enhanced Access Study Results

Coordinated Plan Development

- Combine Reliability and Enhanced Results
- OSC publishes DRAFT Plan
- TAG review and comment

TAG Meetings



Questions?
or
Comments

Transmission Advisory Group Enhanced Transmission Access Planning

Pam Kozlowski

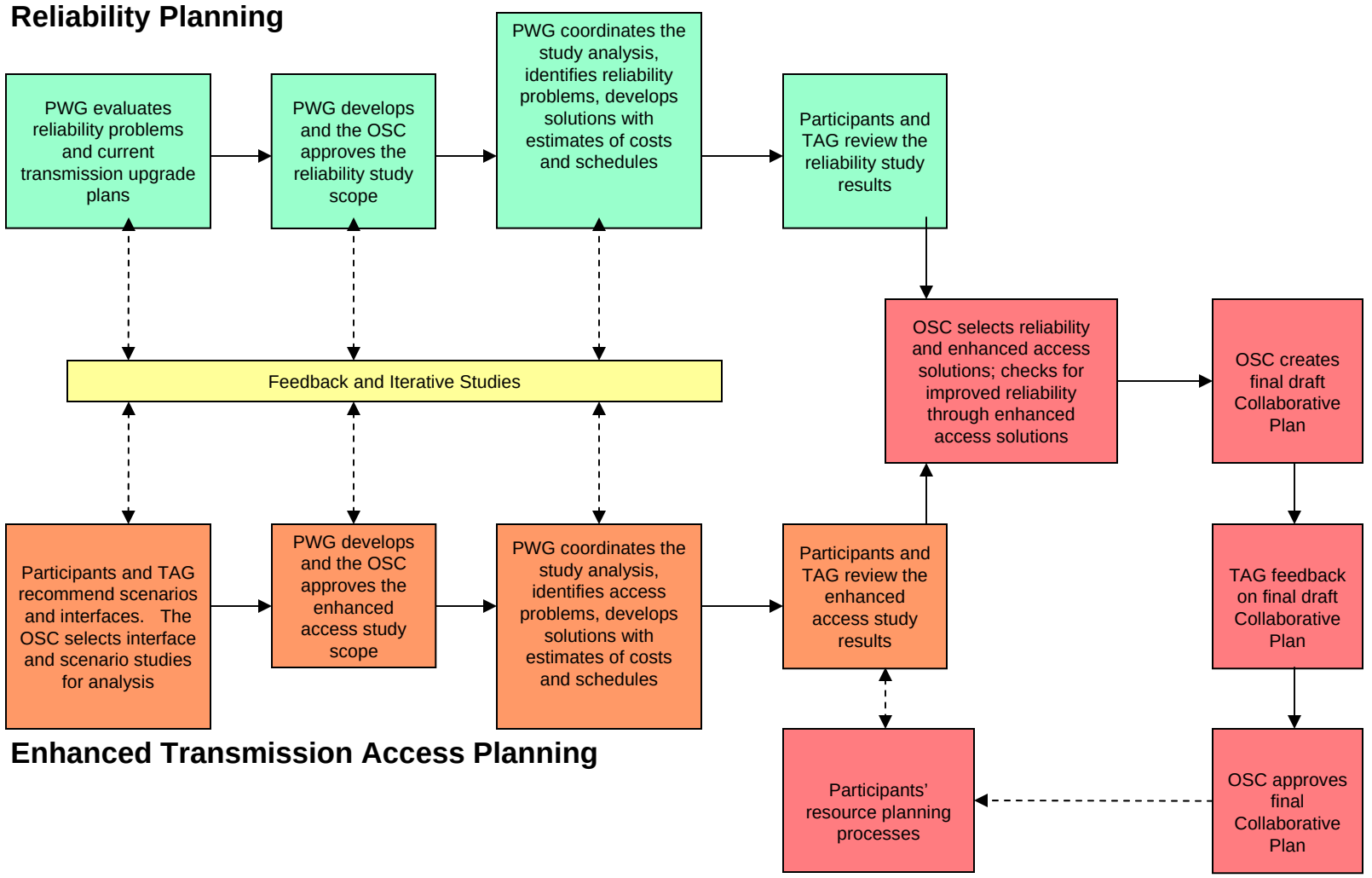
January 25, 2007

Enhanced Transmission Access Planning

- **PURPOSE - Evaluate the means to increase transmission access to potential resources inside and outside the control areas of Duke and Progress to serve load in NC.**

- **FIRST STEP - Participants and TAG members propose scenarios and interfaces to be studied.**

NCTPC Process Flowchart



Enhanced Transmission Access Option Form – Part 1

Date of Submittal
Submitting Company
Company Contact
Contact Phone Number
Contact E-Mail Address

Enhanced Transmission Access Option Form – Part 2

Sink 1. Specify Duke, CPLE, or CPLW as the sink control area. 2. Specify LSE, if applicable.	
Source 1. Specify the source control area. 2. Specify if the transaction is a system purchase or purchase from a specific generator(s). If from a specific generator(s), provide location of the generator for proper modeling. Attach interconnection one-line diagram as necessary.	
Point-of-Receipt/Point-of Delivery Path: (Examples: AEP/DUK – DUK/CPLE; SCEG/CPLE; SOCO/DUK)	
Maximum Capacity in MW Summer Winter	
Start date	
End date, if applicable	
Purpose and benefit for this study request.	

Enhanced Transmission Access Planning

- **TAG Responses – Due by February 14, 2007**
- **Email Forms to: Pam Kozlowski, Gestalt LLC**

pkozlowski@gestalt-llc.com

- **PWG reviews all proposed scenarios / interfaces and provides OSC a recommendation on the Enhanced Transmission Access Options for analysis in 2007**
- **OSC to provide TAG feedback by end of March 2007**

Enhanced Transmission Access Planning – TAG Input

QUESTIONS ?

or

COMMENTS

Transmission Advisory Group 2007 Activity Schedule

Rich Wodyka

January 25, 2007

2007 - 1st Quarter Activities

- ✓ Receive presentation on the 2006 Collaborative Transmission Plan results and provide comments
- ✓ Provide comments on the NCTPC Process
- ✓ Review and comment on the 2007 Study Scope
- ✓ Review and comment on the 2007 TAG Activity Schedule
- Provide input on proposed Enhanced Transmission Access scenarios and interfaces for study and receive feedback from OSC
- Receive and comment on the 2006 Supplemental Study Report

2007 - 2nd Quarter Activities

- Receive presentation on the 2006 Supplemental Study Report and provide comments to the OSC
- Provide feedback to the OSC on the Enhanced Transmission Access scenarios and interfaces selected for analysis in 2007
- Receive a progress report on the 2007 Planning study activities and results
- TAG Meeting in April 2007

2007 - 3rd Quarter Activities

- **Receive a progress report on the Reliability Planning studies and the Enhanced Transmission Access Planning studies**
- **TAG meeting in September 2007**

2007 - 4th Quarter Activities

- **Receive and review a final draft of the 2007 Collaborative Transmission Plan report**
- **January 2008 - TAG meeting to receive a presentation on the 2007 Collaborative Transmission Plan results and provide comments to the OSC**

TAG 2007 Activity Schedule

QUESTIONS ?

or

COMMENTS

TAG Open Forum

Discuss any items relevant to the NCTPC Process

Comments or Questions